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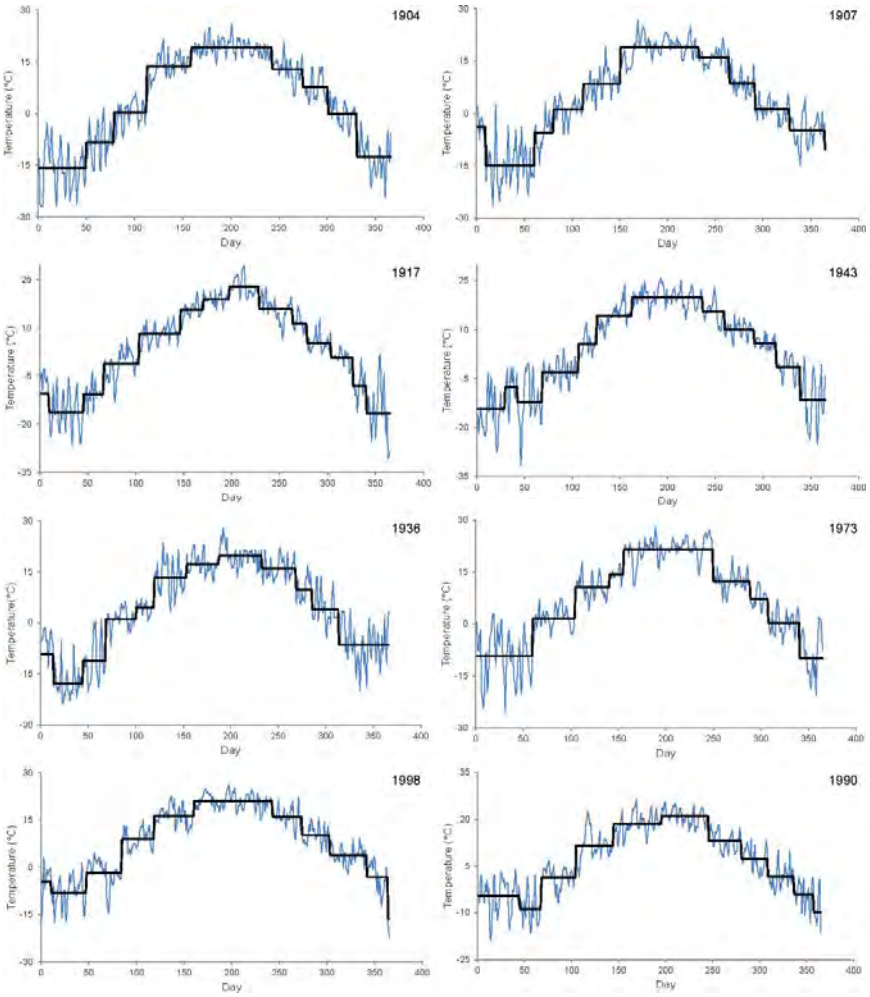
SCMO

Canadian Meteorological and Oceanographic Society

La Société canadienne de météorologie et d'océanographie

Août / august 2012 Vol.40 No.4

Regime Analysis on Temperature Daily Data from Ottawa



Analyse des régimes de température journalière pour Ottawa

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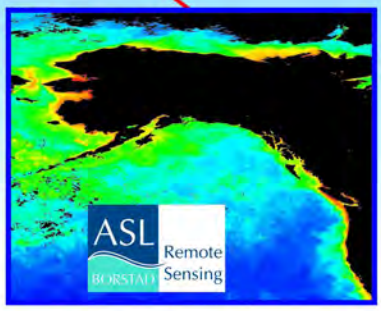

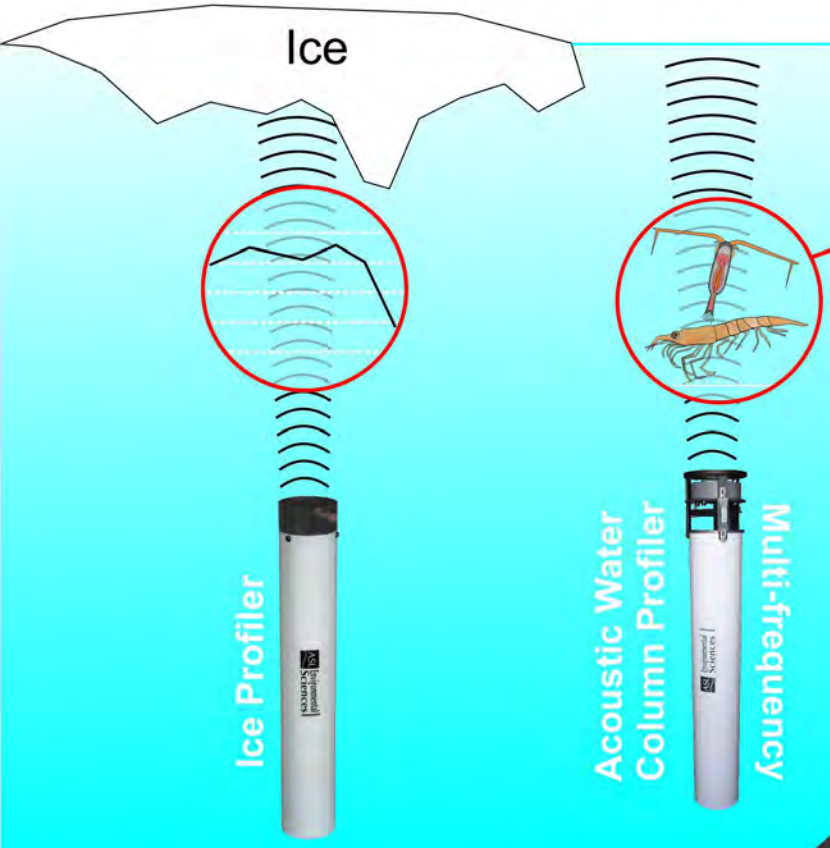

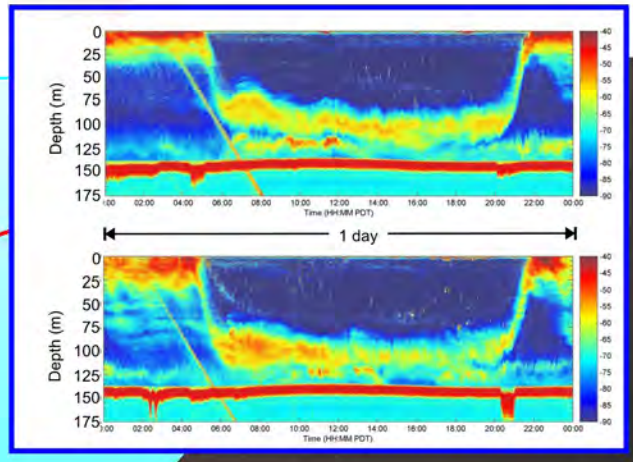

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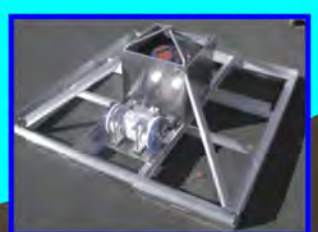

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....from the President's Desk / Allocution du président

Friends and colleagues:

Peter Bartello
CMOS President
Président de la SCMO

I hope you all enjoyed a relaxing summer. As I write this column in late June, I am still buzzing with new ideas provoked by our excellent congress in Montréal. This year's version was held jointly with two meetings of the American Meteorological Society, namely their conferences on Numerical Weather prediction and Weather Analysis and Forecasting. Given Environment Canada's leadership role in these subjects at its Dorval facility, a lot of new ideas and talent were indeed on display. There were around 700 participants, much media attention and a very smooth and efficient operation. Our congratulations go to the many volunteers who made it happen under the leadership of **Louis Lefaivre** (Local Arrangements Committee) and **Pierre Gauthier** (Scientific Program Committee). Whereas last year's congress in Victoria had a centre of mass much closer to oceanography, next year's in Saskatoon will include more hydrology, being held jointly with the Canadian Geophysical Union and the Canadian Water Resources Association. It will also include sessions sponsored by the Pacific Institute of Mathematical Sciences. As you may know, scientific societies all over the world have designated 2013 as the year of "Mathematics of Planet Earth" (see http://mpe2013.org/). I have been attending CMOS congresses since 1987 and am still amazed at the breadth of discussion. Whereas we probably all attend very focussed international meetings in our area of expertise, there is no place like a CMOS congress to get a feel for recent developments across the broad spectrum of meteorology and oceanography. I hope to see you all in Saskatoon.

At this particular time CMOS is undergoing its periodic changing of the guard. The executive committee is now based in Montréal and many of its members from the Victoria region have stepped down. The Society would like to express its deepest thanks for excellent service to **Jane Eert, David Fissel, Sophia Johannessen, Charles Lin** and **Rich Pawlowicz**. Having had the pleasure of working with them over the last year, I know they will continue to contribute to our community in the future.

(Continued on page 119 / Suite à la page 119)

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Articles

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Cover page: The annual temperature cycle can be described and analyzed as a series of regimes, separated by rapid transitions. The figure shown on the cover page illustrates the regimes of temperature for daily data from Ottawa for ten different years. The statistics of regime length transition dates are compared between warm and cold years and over time. To learn more, please read the article written by Agapitos and Gajewski on **page 121**.

Page couverture: Le cycle annuel de température peut être représenté et analysé comme étant une série de régimes séparés par de rapides transitions. La figure de la page couverture illustre le régime de température pour des données journalières enregistrées à Ottawa durant dix années distinctes. Les statistiques de dates de transition des régimes ont été comparées selon que les années étaient chaudes ou froides, et suivant leur évolution temporelle. Pour de plus amples renseignements, veuillez lire l'article rédigé par Agapitos et Gajewski, à la **page 121.**

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

Thanks also go to their replacements, who are **Nacéra Chergui, David Huard, Pierre Gauthier, André Giguère** and **Tetjana Ross**. In these days of increased administrative busy-work their willingness to take on this extra load is very much appreciated. Finally, we all need to thank **Norm McFarlane** for his active year as the Society's president. Since he is still on the hook for another year as Past President, members should be reassured that Norm's experience and wisdom will continue to be put to use.

The Society will also continue pursuing a number of initiatives inherited from previous executives. One of these is formalising the legal status of the Canadian Societies for the Geophysical Sciences (CSGS). When up and running its members will include CMOS and other similar organisations from all the geosciences, so that we can speak to government, industry, funding agencies and the public with one voice, where that is appropriate. Another ongoing topic concerns CFCAS. As most of you know, the Foundation will no longer be distributing federal-government grant money. It now seeks to redefine its mandate as a facilitator and knowledge translator between scientists and policy makers. The precise details, along with its relationship to CMOS are still being worked out. Finally, CMOS headquarters is composed of a small number of people doing a large amount of work. A redistribution of the tasks, succession planning and how to finance them are important topics of current discussion.

In closing I feel a responsibility to add a word about the current difficulties in our science's relationship with the federal government. Although far from being extremely powerful, the Society does have some influence, stemming from the importance of our work to the country. As CMOS members we would like to pursue the reason for our existence: to advance meteorology and oceanography in Canada. Clearly, some care and thought is required if we are to improve the situation and little imagination is required to think of scenarios where we might make it worse. While the discussion continues, we are actively engaged with the Science Media Centre of Canada

http://www.sciencemediacentre.ca

whose goal is to *"raise the level of public discourse on science in Canada by helping journalists access the experts and evidence-based research they need to cover science in the news"*. They would of course be useful if we were to engage the public directly, via the media, on the need for our continued well-being. We are also members of the Partnership Group for Science and Engineering

http://www.pagse.org

Although not a lobby group, they take it upon themselves to educate parliamentarians, government departments, agencies and the general public on recent advances in science and engineering. We also participate in the Canadian Consortium for Research (http://ccr-ccr.ca/), which is a lobby group promoting fundamental research, composed of a number of organisations spanning the range from social sciences to physics. All of these will be useful in getting our message out to the right people, once we formulate it. From the discussions I have had with many CMOS members over the last year, I think there is a clear desire to express in a very positive manner exactly what we do, how it is improving every year, and why it is important that it continue. There is also a consensus that we need to devote more attention to communicating this to Canadian society.

As always, we welcome feedback on these and any other topic.

Peter Bartello
CMOS President / Président de la SCMO

Next Issue *CMOS Bulletin SCMO*

Next issue of the *CMOS Bulletin SCMO* will be published in **October 2012.** Please send your articles, notes, workshop reports or news items before **September 5, 2012** to the address given on page 118. We have an URGENT need for your written contributions.

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

Analysis of the seasonal cycle of the climate record of Ottawa, Ontario

by Katherine Agapitos[1] and Konrad Gajewski[2]
Laboratory for Paleoclimatology and Climatology / University of Ottawa

Résumé: Un algorithme de détection de changement de régime (*regime shift*) a servi à analyser les températures journalières relevées à Ottawa, afin d'examiner le cycle saisonnier du XX^{e} siècle. La longueur moyenne des régimes des années les plus chaudes s'avère légèrement supérieure à celle des années les plus froides. Toutefois, cette différence n'est pas statistiquement significative. Aucune tendance n'a été détectée en ce qui concerne la longueur des régimes ou le nombre de régimes au cours du XX^{e} siècle. Les dates de transitions de l'hiver au printemps, ainsi que de l'automne à l'hiver, indiquent toutefois un allongement de la saison de croissance pour cette période.

Introduction

Although the seasonal cycle is ultimately caused by predictable and essentially invariable astronomical factors, in practice the meteorological seasons vary from year to year in timing, duration and character. The transition into a given season may be abrupt or gradual and might occur sooner or later. Meteorologists sometimes describe this transition as a "regime shift" - an abrupt transition from, for example, a winter to spring circulation pattern. These shifts can be detected through breakpoint analyses (Fraedrich et al., 1997; Kemp et al., 1994), although quantitatively defining regime shifts and the nature of the seasonal cycle is a challenge (Lemay, 2002). However, understanding the nature of the annual temperature cycle is important; phenological parameters such as flower blooming or ice freeze-up and break-up show changes that can be attributed to global warming (e.g., Bonsal & Prowse, 2003; Schwartz et al., 2006), as a consequence of changes in the atmospheric seasonal cycle.

In the context of this study, a regime is broadly defined as a given period of time where temperatures remain stable around a mean value, i.e. stationary. Synoptic events, such as cold front passages, occur over short time periods and therefore there may be one, several or many in any regime, while the seasons themselves are longer-lived phenomena, occurring over months. Regimes are therefore characterized as stationary temperature states occurring over longer time periods, typically in the monthly range. A regime shift is defined as a transition from one regime to a new stable regime, occurring on a given day or several at most. Quantifying potential regimes, their shifts, and how they change through time will allow for a further understanding of the seasonal temperature cycle, which in turn will allow for observations of trends in a changing climate.

The objective of this study is to identify regimes in the temperature record of Ottawa, Ontario, over the past century, through the analysis of daily station data. Asselin (2010, 2012) has recently analyzed these data in some detail, investigating the long term changes in the temperature record, as well as changes in extreme temperatures, extracted as anomalies from a smooth annual cycle. Maximum and minimum daily temperatures have increased over the past 120 years but at different rates, leading to a reduction in the daily temperature range. We here take an alternative approach by studying the annual cycle as a series of regimes, separated by rapid regime shifts. This approach allows for an alternative examination of the seasonal temperature cycle and the nature of the transitions into the pronounced summer and winter seasons that characterize the Ottawa region. This approach allows for an in-depth examination of the seasonal temperature cycle and the nature of the transitions into the pronounced summer and winter seasons that characterize the Ottawa region.

Data and Methods

The Central Experimental Farm of Ottawa location has had a weather station in operation since the late 1800s. Although there have been some instrument changes, there was only one small location change in 1924, allowing for a consistent record (Environment Canada, 1981). Daily station data for the Ottawa CDA station were extracted from the *EarthInfo Global Daily CD-ROM* (EarthInfo, 2012). Temperature records for Ottawa commenced in 1890, however, due to a large number of missing data between 1890 and 1899, a study period commencing in January 1900 and terminating in December 2009 was selected. Missing observations (0.001% of all data) were estimated by calculating the mean of the data point preceding and following the missing observation.

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University of Ottawa, Ottawa, Ontario, Canada

The analysis used the methodology of Rodinov (2004, 2006) designed specifically for climatological data (Chiba *et al.*, 2008; Mueller *et al.*, 2009; Matic *et al.*, 2011). The program uses an algorithm for a sequential t-test, where deviations from the mean temperature value are identified and compared to a critical value. As each new observation is added a new test is performed. The test determines the validity of the null hypothesis (H_0) that the mean values of the two regimes are equal. The strength of a regime is quantified by the Regime Shift Index (RSI), which is highly dependent on the cut-off length (l) and the probability level (p). Only regimes longer than the assigned cut-off length will be detected, unless their RSI values are large enough to be detected.

In this study, experiments were conducted in order to determine the appropriate program input parameters, and showed that using a probability level of 0.05 and a cut-off length of 30 days provided the most reasonable results. In order to eliminate edge effects at the beginning (January) and end (December) of the year that might affect regime lengths and shift dates, daily station data were combined to form 10-year continuous segments and analyzed as continuous series.

Results

In most years, temperatures increase in an irregular manner from winter to spring, and these can be identified as a series of regimes, until they reach a relatively long plateau defining the summer (Figure 1). The number of transitions from the minimum temperature period to the maximum period ranges between roughly four and six transitions. The period of maximum temperatures, typically around day 200, can be relatively long (e.g. 1904, 1998) or short (e.g. 1917), and in some cases can be a series of two regimes (e.g. 1990). Similarly, the autumn to winter transition occurs through several stepwise regime shifts towards the winter minimum, and the number of transitions is also within the same range of four to six. Minimum temperatures frequently occur around day 30 to day 50, although in some years the minimum temperatures occur in late December through the New Year (around day 10). In some years, the period of minimum temperatures is characterized by one long regime (e.g. 1904) or it can be broken up into two or more regimes in other years (e.g. 1943). The period of minimum temperatures is characterized by having higher day-to-day variability in mean temperature values, due to the fact that the atmosphere is the most energetic in winter. Conversely, the summer period is a period of relatively low variability in daily observations, shown through the flatter maximum temperature periods and the more fragmented minimum periods.

Coldest Years

Rank	Year	Number of regimes	Mean regime length	St. Dev.
1	1904	8	42.1	19.7
2	1917	13	27.7	8.6
3	1926	9	37.1	17.5
4	1934	11	33.9	9.9
5	1940	11	30.7	11.8
6	1943	11	31.5	16.2
7	1907	8	38.3	17.5
8	1935	10	36.7	10.0
9	1939	12	31.8	12.6
10	1936	11	38.8	30.3
	Average	10.4	34.1	15.4
	St. Dev.	1.6	3.9	6.5

Warmest Years

Rank	Year	Number of regimes	Mean regime length	St. Dev.
1	1998	10	37.0	17.6
2	1999	11	32.9	15.7
3	2006	11	33.2	11.0
4	1953	8	42.0	18.7
5	2001	8	41.4	25.0
6	1991	9	38.0	13.6
7	1990	9	35.4	10.5
8	1921	11	39.4	16.4
9	1987	11	35.9	9.4
10	1973	8	45.5	28.5
	Average	9.6	38.1	16.6
	St. Dev.	1.3	4.0	6.2

Table 1: Number of transitions and mean length of the ten coldest and warmest years (mean annual temperature) between 1900 and 2009 at Ottawa CDA. Mean regime length is expressed in days. St. Dev. is the standard deviation.

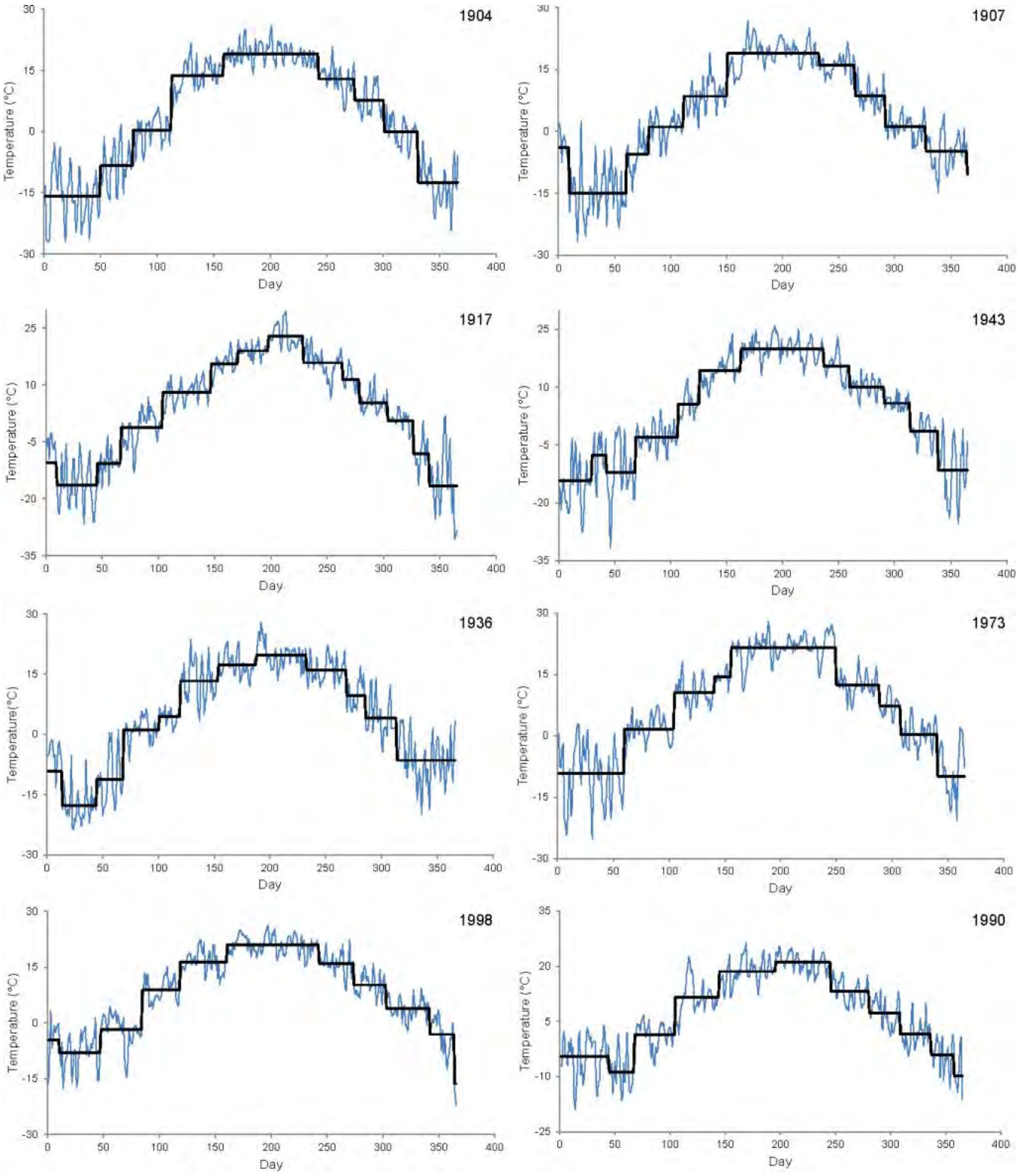


Figure 1: Example of regime analysis on daily data from Ottawa CDA.

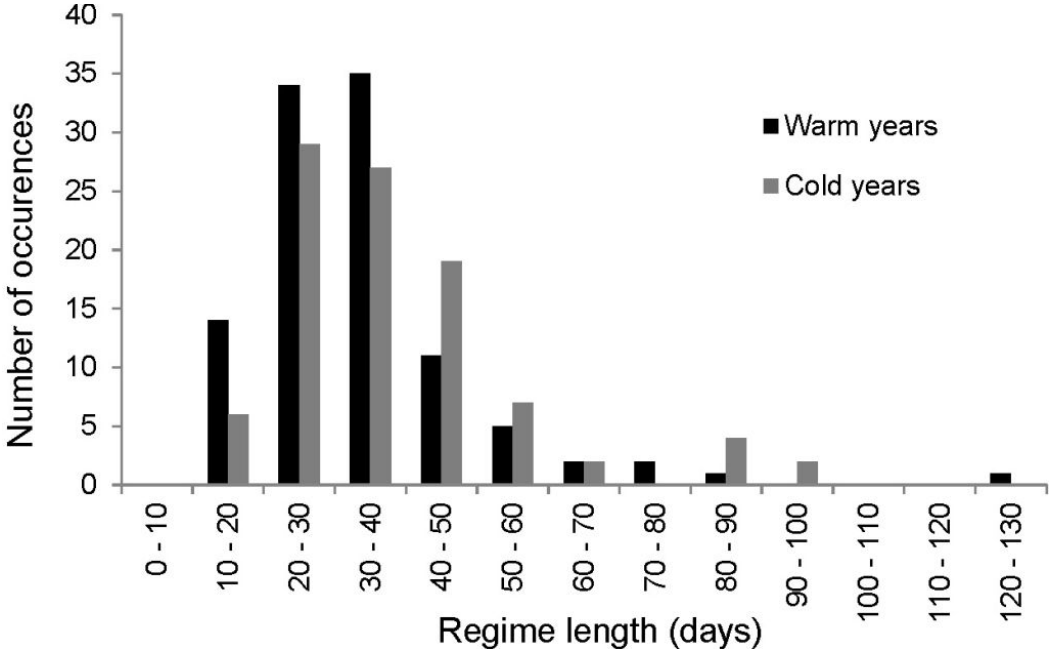


Figure 2: Histogram of regime length distribution for the ten warmest and ten coldest years between 1900 and 2009 at Ottawa.

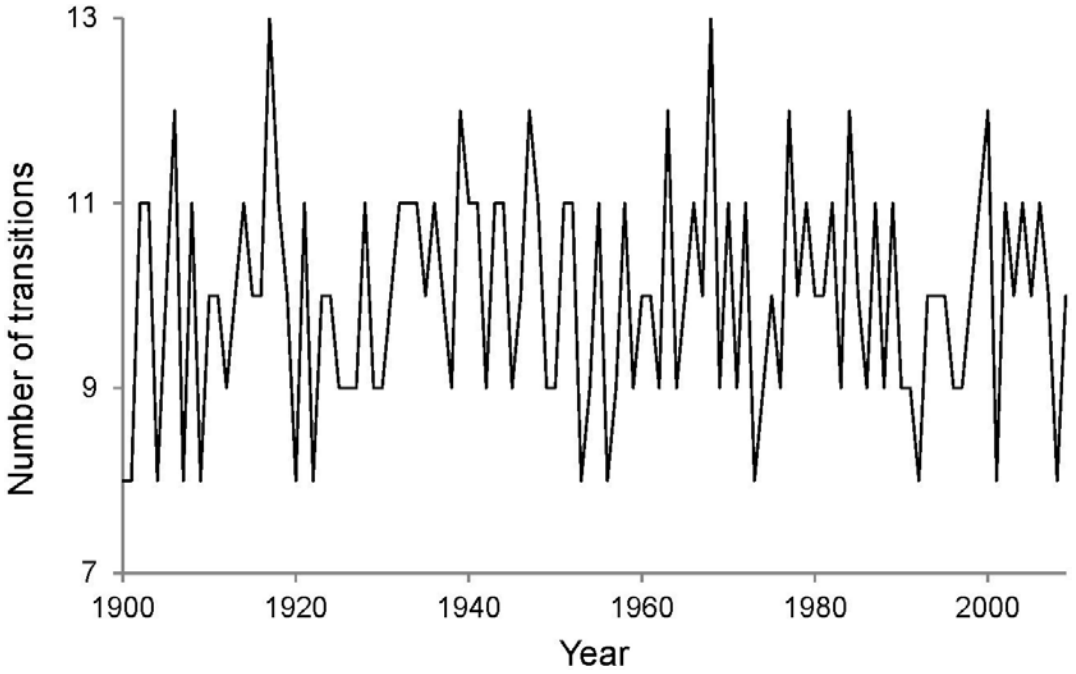


Figure 3: Number of transitions as a function of year between at Ottawa CDA.

Regime statistics were compared between the ten coldest and ten warmest (mean annual temperature) years (Table 1). In cold years, the mean number of regimes is of 10.4 regimes with a mean regime length of 34.1 days. In warm years, there are fewer regimes (9.6) with a correspondingly greater mean regime length of 38.1 days; the difference between the cold and warm years is not statistically different. In both sets of years, the number of regimes can be as high as 13 (e.g. 1917) and as low as 8 (e.g. 1973). Generally, regimes are similar in length regardless of their placement throughout the year, and there tends to be one lengthier regime, typically in the middle of the annual regime sequence (e.g. 1907). In most years, regime length typically ranges between 30 and 50 days, but can be greater than 100 days (e.g. 1936).

In warm years, the most common regime length tends to be in the range of 20-40 days in length, with several regimes in the 10-20 range and the 40-50 range (Figure 2). In cold years, distribution of regimes throughout each category is more even, with a larger number of longer regimes up to 60 days, while the total number of occurrences per regime length category is lower in cold years than in warm years.

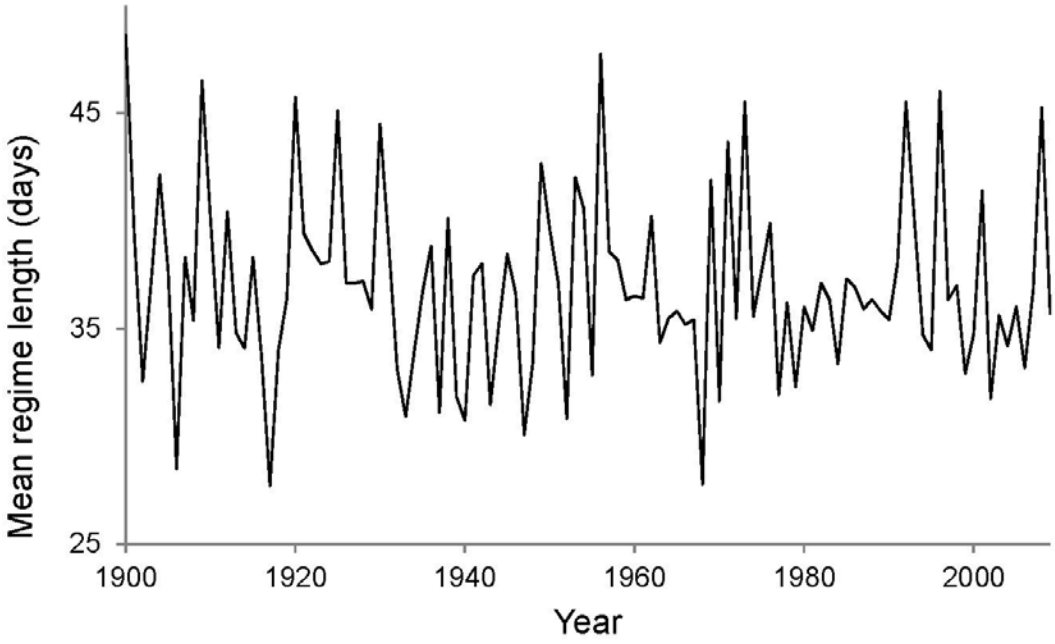
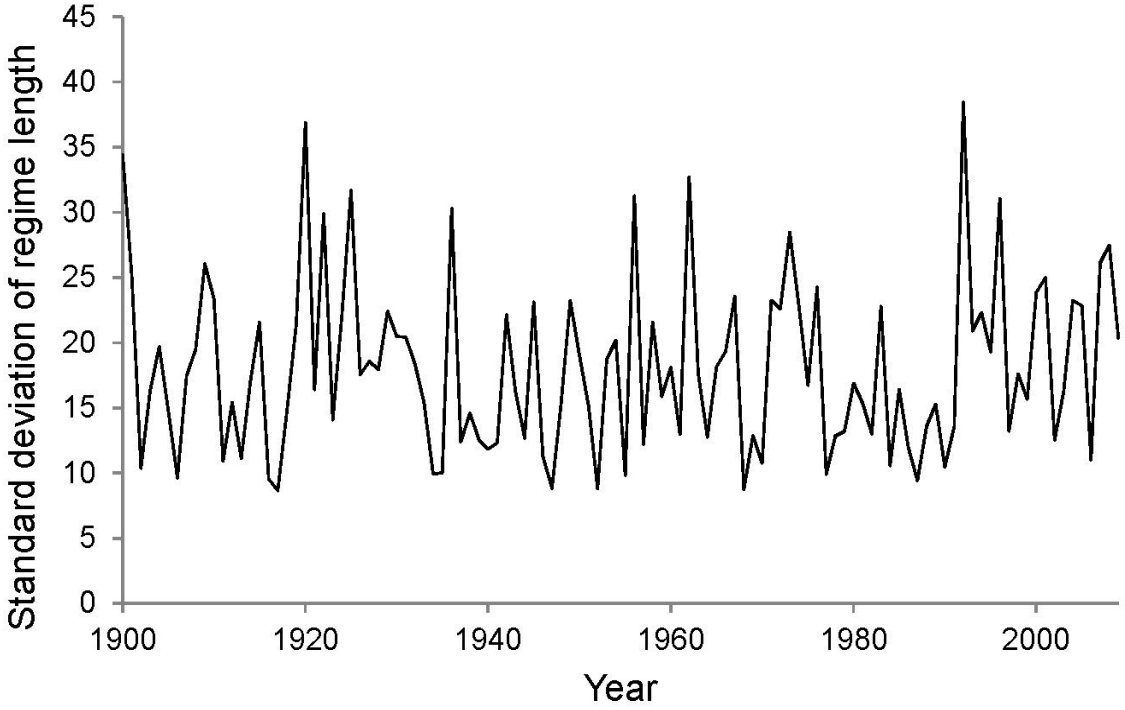


Figure 4: Mean regime length as a function of year between at Ottawa CDA.

Figure 5: Standard deviation of regime lenght as a function of year at Ottawa CDA



For both cold and warm years, no regimes fall in the 0-10 day range, a result of the selected cut-off length of 30. In both sets of years, the maximum regime length is no longer than 100 days, with the exception of one occurrence of a regime greater than 110 days.

The number of transitions per year ranged from 8 to 13 transitions, with no tendency through time (Figure 3). Over the entire record, the mean number of transitions was of 10.0 transitions with a standard deviation of 1.2. The annual mean regime length per year ranged from 27.7 to 48.6 days, with an overall mean of 36.9 days and a standard deviation of 4.2 (Figure 4). No long-term tendency toward longer or shorter regimes was detected, but there are some decadal-scale fluctuations in regime length. For example, regime length tended to decrease from the 1920s through the 1950s, and tended to increase up to 1960. There is considerable variability in the regime length (Figure 5).

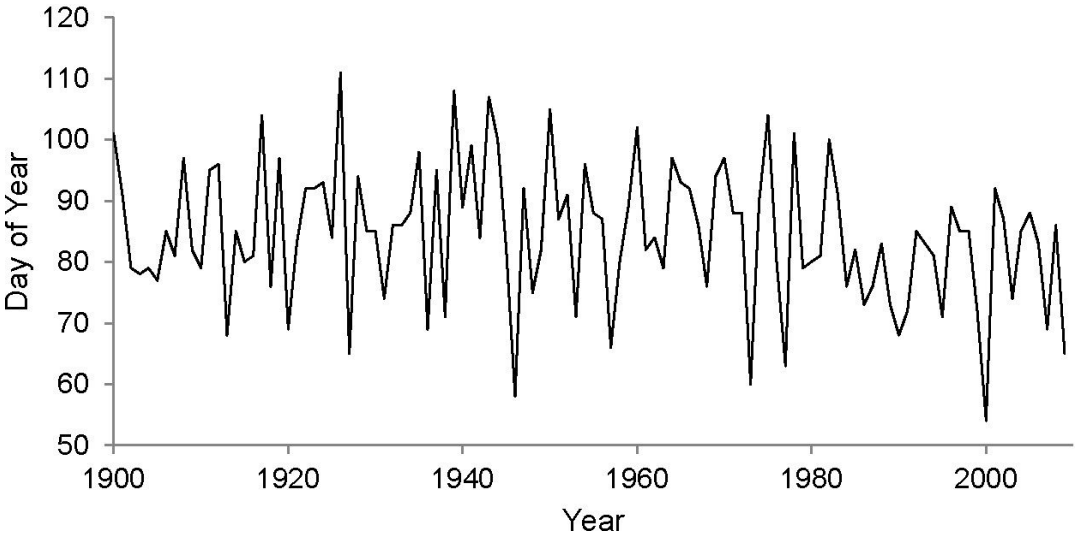


Figure 6: Date of the beginning of spring regime at Ottawa CDA.

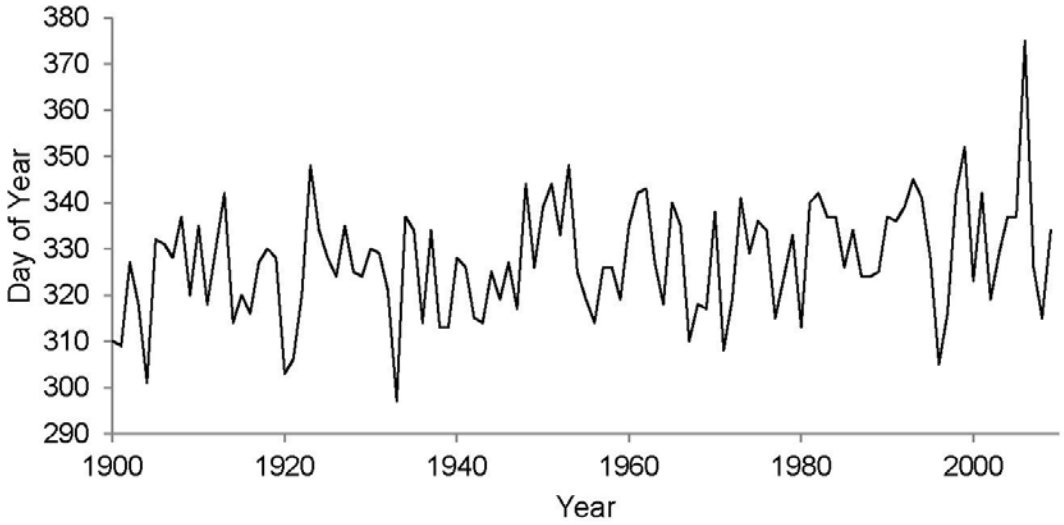


Figure 7: Date of the end of autumn regime for Ottawa CDA.

The transitions into the beginning of spring and the end of autumn were further examined. Spring is defined as the first regime where mean temperatures are above 0°C, and autumn is defined as the first regime following summer when temperatures dip below 0°C. The transition into spring typically occurred between regime numbers 1 and 4, with a minimum date of 54 (February 24) and a maximum date of 111 (April 20) (Figure 6). The mean date over the period is 84.5 (March 26). Between 1910 and the late 1970s, there was no evident trend for the date of shift. Starting in 1980, a decreasing trend until the end of the century is evident. The mean date of shift for this last 20-year period is 79.6, compared with the mean date of shift of the previous 90 years of 86.4. This slight decreasing trend at the end of the period suggests that the onset of spring is occurring earlier in the annual cycle, ultimately resulting in the lengthening of the growing season.

The transition into autumn typically occurred between regime numbers 7 and 12, with a minimum date of 297 (October 23) and a maximum date of 375 (January 10 of the following year; this only occurred once, in 2006) (Figure 7). The mean date of shift over the period is 327.4 (November 22) with a mean regime length of 35.7 days. Throughout the study period, there was a gradual increase in the date of the autumn transition. Thus, the end of autumn is occurring later in the year, indicating a lengthening of the warm period in Ottawa over the 20th century. This result combined with the observed earlier onset of spring starting in the 1980s demonstrates a recent increase in temperatures resulting in a prolonged growing season, concurrent with evidence for global warming (IPCC, 2007).

Discussion

Experience suggests that the atmosphere tends toward long periods with relatively comparable conditions, separated by relatively rapid transitions to a new state. These are determined by the dynamics of the major components of the

atmosphere. Once the parameters of the model were chosen and set sufficiently high to avoid detecting individual synoptic events as a regime, the method used in this study proved capable of identifying these regimes in the data from Ottawa.

Slight differences in the number of regimes between cold and warm years were found, with warm years tending to have slightly fewer regimes with a longer length than cold years. This may be associated with smaller pole-to-equator temperature gradients in warmer years, and therefore fewer cyclones, with the associated changes in air mass distribution. The number of regimes and their length do not change, however, through time. The reasons for this are not clear; there may simply be upper limits to the time the atmosphere can stay in one particular state. However, given the large standard deviation in regime length, it would be difficult to find statistically significant differences with these data. To understand these results, it would be necessary to replicate this study using data from many stations, preferably distributed around the globe, and to study the spatial pattern of the regime shift statistics.

It is when examining the onset of spring and the end of autumn that trends became detectable. There was an increase in the growing period of the annual cycle throughout the 20th century, especially starting in the 1980s. The earlier onset of spring as well as the later onset of autumn causes a lengthening of the warm periods, while periods where temperatures are below zero are shrinking. The use of regimes to identify these transitions is a useful methodology for this purpose.

Future studies are necessary in order to understand the nature of regimes in the annual cycles on a regional and even global scale. For example, analyzing maximum and minimum temperature data between or among the regimes identified here could provide insight into changes in variability through time (Asselin, 2012). Studies projecting future changes in spring and autumn transitions will also be valuable to gauge the fate of regimes and the onset of the seasons into the future. In this case, a first step would be to study the output of global climate models using this methodology, to determine if the model is producing similar dynamics at this scale as the real atmosphere. These studies would allow for informed decisions for the mitigation and management of areas affected by an increase in warm periods throughout the annual temperature cycle.

Acknowledgements
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Parsons 2012 Medal Award Presentation

At the annual congress of the Canadian Meterological and Oceanographic Society, on May 30, Dr. Siddika Mithani, Assistant Deputy Minister, DFO/Science Sector, presented the 2012 Parsons Medal in Multidisciplinary Ocean Science from Fisheries and Oceans Canada to **Professor Louis Fortier** from Laval University and also director of ArcticNet.

DFO established the Timothy R. Parsons Award in 2004 to pay tribute to excellence in Canadian ocean sciences and honour a scientist for either outstanding lifetime contributions or for a recent exceptional achievement in multidisciplinary facets of ocean sciences, while working within a Canadian institution. The first award was presented to Dr. Parsons himself who was also a recipient of The Order of Canada.

Drs. Louis Fortier and Siddika Mithani

Dr. Fortier received his B.Sc. and M.Sc. from the Université Laval in 1976 and 1979, respectively. In 1983 he received his Ph.D. from the University of Manitoba.

A specialist in zooplankton and fish, Louis Fortier has authored and co-authored over 90 scientific papers on subjects from carbon fluxes in the Arctic Ocean to policy in a changing Arctic, and is a tireless promoter of a multi-disciplinary and cross-sector approach to the ecosystem-level concerns raised by a warming of the Arctic. Dr. Fortier was nominated for his incredible contribution to international collaboration and mentoring interdisciplinary scientists, including through ArcticNet; work that has contributed significantly to the further development of multidisciplinary ocean science.

Dr. Fortier is the scientific director of ArcticNet, a Canadian Network of Centres of Excellence that brings together specialists from 27 universities for integrated study of the transformation of the coastal Canadian Arctic, which has made such an outstanding contribution to the careers of many scientists and to our understanding of the Arctic. Currently, in addition to his position as a professor at the Université Laval, Dr. Fortier holds the Canada Research Chair on the Response of Arctic Marine Ecosystems to Climate Change and is the project leader for the CFI-funded Canadian Research Icebreaker Amundsen.

Congratulations to Dr. Fortier from all the CMOS Community.

Présentation de la médaille Parsons 2012

Le 30 mai dernier, lors du congrès annuel de la Société canadienne de météorologie et d'océanographie, Siddika Mithani, Ph.D., Sous-ministre adjointe, MPO secteur Sciences, a remis la médaille Timothy R. Parsons 2012 de Pêches et Océans Canada au **Dr. Louis Fortier**, professeur en océanographie à l'université Laval et directeur du réseau ArcticNet. Cette médaille est décernée chaque année pour l'excellence dans les sciences océaniques multidisciplinaires.

La médaille Timothy R. Parsons a été créée par le MPO en 2004 afin de reconnaître les réalisations hors du commun dans le domaine de la recherche sur les océans. Elle est décernée à un scientifique canadien qui s'est distingué par sa contribution remarquable dans un domaine multidisciplinaire lié à l'océanographie. Elle fut octroyée la première fois au Dr. Parsons lui-même qui est également récipiendaire de l'Ordre du Canada.

M. Fortier détient des diplômes de baccalauréat et de maîtrise en sciences de l'Université Laval, obtenus respectivement en 1976 et en 1979. En 1983, il a décroché un diplôme de doctorat de l'Université du Manitoba.

En tant que spécialiste du zooplancton et du poisson, Louis Fortier a rédigé et corédigé plus de 90 articles scientifiques sur des sujets comme les flux de carbone dans l'océan Arctique ou encore les politiques qui tiennent compte des changements en cours dans l'Arctique. Il œuvre sans relâche à la promotion d'une approche multidisciplinaire et intersectorielle pour les préoccupations écosystémiques soulevées par le réchauffement de l'Arctique. M. Fortier a été mis en candidature pour sa contribution incroyable à la collaboration internationale, pour le mentorat qu'il a offert à des chercheurs interdisciplinaires, notamment dans le cadre d'ArcticNet, et pour ses travaux, qui ont joué un rôle important dans le développement de l'océanographie multidisciplinaire.

M. Fortier est le directeur scientifique d'ArcticNet, un réseau canadien de centres d'excellence qui réunit des spécialistes provenant de 27 universités pour l'étude intégrée de la transformation des côtes de l'Arctique canadien, qui a joué un rôle important dans la carrière de nombreux chercheurs et dans notre connaissance de l'Arctique. Outre son travail de professeur à l'Université Laval, M. Fortier est actuellement titulaire de la chaire de recherche du Canada sur la réponse des écosystèmes marins arctiques au réchauffement climatique et chef de projet du Amundsen, un brise-glace de recherche canadien financé par la Fondation canadienne pour l'innovation.

Félicitations au Dr. Louis Fortier de la part de tous les membres de la SCMO.

2011 Patterson Medal Award Presentation

The Patterson Distinguished Service Medal, first presented in 1954, is considered the pre-eminent award recognizing outstanding work in meteorology by residents of Canada. This award is named in honour of Dr. John Patterson, a meteorologist who was Director and Controller of the Meteorological Service of Canada from 1929 to 1946, a crucial period in the development of Canada's weather service.

David Grimes, Assistant Deputy Minister, Meteorological Service of Canada and President of World Meteorological Organization (WMO), presented the medal to **Dr. John Gyakum**, Professor of the Department of Atmospheric and Oceanic Sciences at McGill University with the following words:

"For over 30 years, Dr. Gyakum has been a leading member in Meteorological research and teaching both here in Canada and internationally".

"The selection committee for this award was very impressed with the breadth of support for Dr. Gyakum that came equally from academic and government representatives in meteorology".

Dr. John Gyakum and David Grimes

"As I will explain, Dr. Gyakum is clearly a person who not only has been extremely effective in research but also in teaching undergraduate and graduate students and outreach to the general public – all while chairing the department of Atmospheric and Oceanic Sciences at McGill University".

To paraphrase his colleagues:

> "John has authored or co-authored more than 90 refereed publications…Collectively, these papers advanced our scientific understanding of oceanic cyclones considerably and in turn resulted in significant improvements in operational forecasting of oceanic cyclones". – *(Now there is someone who is making our jobs easier at the MSC!).*

Another:

> "John's contributions to education and mentoring of students..is just as impressive as his research and intellectual contributions to the field".

Finally:

> "If McGill's department of Atmospheric and Oceanic Sciences is as strong as it is today *(and it is very strong in my opinion)*, it is in large part due to John's determination and ability to promote and argue for meteorology and oceanography".

"I'd like to take a few minutes to highlight a couple of Dr. Gyakum's biggest contributions to meteorology".

First - Research:
"As I mentioned earlier John has authored or co-authored more than 90 refereed publications in the many different fields but all have contributed to advancing our understanding and ability to forecast atmospheric phenomena, especially those associated with extreme events. Examples include:

1) Freezing rain, including the 1998 ice storm;
2) Convective storms;
3) Wind storms in the arctic;
4) Tropical storm transitions affecting the Canadian Maritimes and NFLD; and
5) more recently he has moved into the area of climate change research".

"His contributions to research were also recently acknowledged when he was awarded the *2009 Andrew Thomson Prize in Applied Meteorology* from CMOS"!

Second - Teaching:
"Dr. Gyakum is active in both graduate and undergraduate mentorship:

1) He has surpervised nearly 50 masters students, 10 Ph.D. students, two post -doctoral students, and a research associate, indicating his high level of dedication to the graduate program at McGill;
2) Dr. Gyakum developed and teaches an undergraduate course in natural hazards that attracts over 600 students every year".

Third - Outreach/Partnerships with Government:
"He played an instrumental role in the establishment of MSC/COMET training course. This is an academic-government partnership where he has trained more than 250 forecasters from MSC, Defense Weather Services, US Navy, National Weather Service in the US, and Europe. He is said to teach with humour and passion and is a course favourite teaching Quasi-geostrophic Theory, Isentropic Thinking, Potential vorticity, Cyclogenisis".

"Dr. Gyakum has also made efforts to reach out to the general public through a variety of outreach activities, including a number of public lectures and television interviews".

"*And he manages to find the time to do all these things while the Chair of a department"!*

Lastly:
"I want to mention the high regard his colleagues have for Dr. Gyakum's character and personal skills".

"John Gyakum takes a personal as well as professional interest in his students, that is, he practises true mentorship, ensuring that his students develop the work ethic, maturity, and mindset as well as the skills that go along with being a successful scientist".

"John is a real pleasure to work with. His thoughtfulness and tireless leadership in the areas of teaching, research and service, have made a significant positive impact on the profession".

"Félicitations Dr. Gyakum"!

"On behalf of the Meteorological Service of Canada, it gives me great pleasure to present the Patterson Distinguished Service Medal to Dr. John Gyakum".

"Au nom du Service météorologique du Canada, j'ai l'immense plaisir de remettre au Dr. John Gyakum la médaille Patterson pour service distingué".

"Congratulations to Dr. John Gyakum"!

Dr. Gilbert Brunet, 2010 Patterson Medal recipient, with David Grimes after the 2011 Parsons-Patterson Lunch. Photo credit CMOS Bulletin SCMO Editor.

Except for the last photo (Dr. Brunet), photos in this section are courtesy of Richard Verret, the CMOS Montréal Congress official photographer.

Sauf pour la dernière photo (Dr. Brunet), les photos dans cette section ont été prises par Richard Verret, le photographe officiel du congrès de la SCMO à Montréal.

CMOS Prizes and Awards announced at the 46th Annual Banquet
Remise des prix et récompenses de la SCMO au 46e banquet annuel

Grand Salon Opéra, Hôtel Hyatt Regency Hotel, Montréal, Québec
31 mai 2012 / May 31, 2012

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


1. Drs. Norm McFarlane & Nathan Gillett

Awarded in 2011 to **Nathan Gillett**, Environment Canada and University of Victoria, for his pioneering work in the field of climate change detection and attribution, culminating in the influential paper, *"Attribution of polar warming to human influence"*, published in Nature Geoscience in 2008. In this paper, Dr. Gillett led a team of international scholars in the discovery of an anthropogenic warming signal in both the Arctic and Antarctic regions. Through the use of an elegant application of optimal fingerprinting, he was able to show that the warming in these polar regions was directly attributable to human activities. This has led to the realization that we can now detect human-induced regional warming on every continent of the globe.


2. Dr. David Welch, proud recipient of the Tully Medal

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

Awarded in 2011 to **David Welch**, Kintama Research Services Ltd. for his three decades of research dedicated to understanding the sea life of salmon using innovative data-gathering techniques with special reference to acoustic arrays. The resulting data have been correlated with oceanographic conditions and climate change to obtain a much deeper understanding of how the two sciences of fisheries and oceanography are synthesized as a single discipline of Fisheries Oceanography. He has been the leader of a major initiative to track a wide variety of fish species' movements around the Pacific, the Pacific Ocean Shelf Tracking (POST) program. This program has provided a core research platform for a wide range of scientists to address questions concerning fish movement and survival that would be otherwise prohibitively expensive for one researcher to undertake alone.

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


3. Kirsten Zickfeld accepting the prize for Michael Eby

Awarded to **Michael Eby**, University of Victoria, for his sustained contributions towards the development of the UVic Earth System Climate Model, his support of users of the model internationally, and his contributions towards international assessments and model intercomparison projects.

The **François J. Saucier Prize in Applied Oceanography**
may be awarded each year to a member or members of the Society for an outstanding contribution to the application of oceanography in Canada. Unfortunately, the prize was not awarded this year.

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

Awarded in 2011 to **Ford Doherty**, Environment Canada, for his significant contributions to operational forecasting, particularly through his development of the operational archive system, Jervis, which has proven to be an indispensable tool for forecasters. His subsequent development of a weather event simulator (WxEds) has allowed forecasters to retrospectively re-run historical weather events in a 'real-time' mode. This application continues to be one of the most sought-after training applications by operational meteorologists.

4. Ford Doherty accepting the prize from Norm McFarlane

The **Tertia M.C. Hughes Memorial Prize** may be awarded for contributions of special merit by graduate students registered at a Canadian university or by Canadian graduate students registered at a foreign university. Two prizes were awarded in 2011.

1) Awarded to **Eric Oliver**, Dalhousie University, for his outstanding Ph. D. dissertation at Dalhousie University, which has led to three refereed publications in top-tier journals. Each paper has addressed the very significant issue of the Madden Julian Oscillation (MJO), and its effects on various ocean basins. The prize was accepted by Anna Katavouta.

2) Also awarded to **Rodica Lindenmaier**, University of Toronto, for her outstanding Ph. D. dissertation at the University of Toronto, which represents a significant research contribution at the Polar Environment Atmospheric Research Laboratory (PEARL) at Eureka, Nunavut. Her dissertation, addressing science questions within the context of the CANDAC (Canadian Network for the Detection of Atmospheric Change) and focussing on measuring stratospheric composition to improve our understanding of the processes controlling the Arctic ozone budget, has led to at least four refereed publications in top-tier journals.

5. Anna Katavouta accepting the Tertia M.C. Hughes Memorial prize for Eric Oliver from Norm McFarlane

Roger Daley Postdoctoral Publication Award to be made annually to a candidate who, at the time of nomination, is working in Canada in a non-permanent position as a postdoctoral fellow or research associate, and is within 5 years of having received a doctoral degree. The award is to be based on the excellence of a publication in the fields of meteorology or oceanography that has appeared, or is in press, at the time of nomination.

Awarded in 2011 to **Patrick Sheese**, University of Toronto, for his publication, "*Nighttime nitric oxide densities in the Southern hemisphere mesosphere - lower thermosphere*", published in Geophysical Research Letters in 2011. This research builds on a series of his papers describing his novel methods to retrieve atmospheric temperature and chemistry data using the Canadian OSIRIS (Optical Spectrograph and InfraRed Imaging System). His research has made a significant contribution to our understanding of mesospheric-lower thermospheric state variables.

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

Awarded to **Thomas J. Duck**, Dalhousie University, for his outstanding volunteer service to atmospheric science, and particularly to the Canadian ozone monitoring and research programs. He has led a vocal and effective campaign to attract public attention to Canadian atmospheric research and the value of the Canadian Foundation for Climate and Atmospheric Science. His extensive interaction with the media has focussed the public's attention, not only on the need to maintain ozone monitoring in Canada, but also on atmospheric climate change and the value of science in general, in its role of informing public policy and decision making.

6. Norm McFarlane and Thomas J. Duck

Citations

One or more Citations may be awarded each year to an individual, group or organization which has, in the previous year, made some outstanding contribution towards promoting public awareness of meteorology or oceanography in Canada. Two citations were awarded in 2011.

7. Chris Doyle from EC accepting the Citation for Mark Madryga

1) A citation is awarded to **Mark Madryga**, Global TV BC and CKNW Radio, for consistently Outstanding Radio and Television presentations. His extraordinary talents, such as his knowledge of local effects and ability to communicate the uncertainty in developing weather patterns, combined with his commitment to educating the public, are apparent in his presentations.

2) Une citation est également accordée à **Jocelyne Blouin**, Radio-Canada Montréal, pour l'excellence en présentation des prévisions météorologiques à la télévision de Radio-Canada. Allant au-delà de la simple présentation des bulletins météorologiques, elle s'est appliquée durant de nombreuses années à transmettre au public francophone canadien ses connaissances incontestables en météorologie.

8. Louis Lefaivre et Jocelyne Blouin, récipiendaire d'une citation de la SCMO

The **CMOS Undergraduate Scholarship** for students planning a career in atmospheric, hydrological, oceanographic or limnological sciences. Two scholarships were awarded this year.

1) A $500 scholarship was awarded to **Rachel Humphrey**, McMaster, Geography & Earth Sciences for her academic excellence.

2) Another $500 scholarship was awarded to **Michelle Curry**, University of Manitoba, Environment & Geography for her academic excellence.

9. Norm McFarlane and Michelle Curry, recipient of 2 scholarships: the CMOS Undergraduate and the CMOS Weather Network/Météomédia

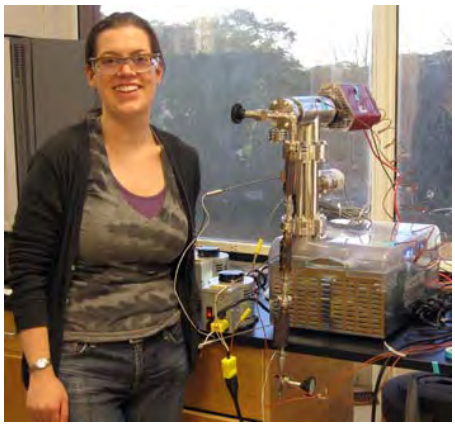
The **CMOS Weather Network / Météomédia Scholarship** offered to a Canadian female student enrolled in the 3rd or 4th year of an atmospheric science degree program at a Canadian university and with career aspirations as a forecast meteorologist, on-air meteorologist or meteorological briefer. It consists of a cheque for $1500. The scholarship is funded by an annual donation from Pelmorex Inc., the parent company of The Weather Network and Météomédia.

The $1500 scholarship was awarded to **Michelle Curry**, University of Manitoba, Environment & Geography, for her academic excellence.

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

La bourse d'étude de 1 000$ est décernée à **Camil Hamel**, Université de Sherbrooke, Physique, pour son excellence académique.

The **CMOS CNC/SCOR NSERC Scholarship Supplement** provides a supplement of $5000 to a holder of an NSERC Postgraduate Scholarship or Canada Graduate Scholarship. It is renewable for a second year provided the Scholarship continues to be held.



10. Cara Manning at work

The Scholarship supplement is awarded to **Cara Manning**, MIT-Woods Hole Institute, for her study of biological productivity and air-sea gas exchange as controls on CO_2 fluxes during sea ice retreat (in the Bras d'Or lakes of Nova Scotia and Canada's Arctic).

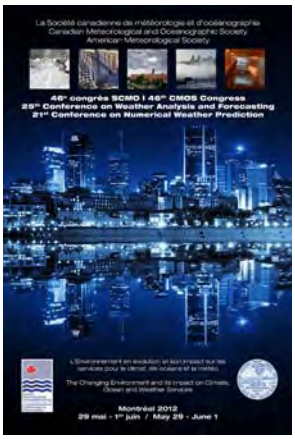
Alireza Mashayekhi, last year's recipient, is not eligible for the second year supplement.

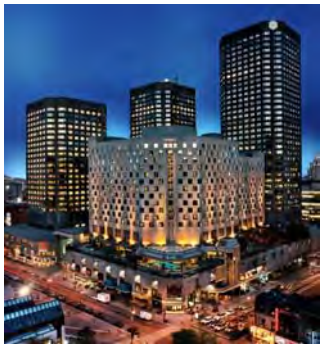
The **CMOS Weather Research House / NSERC Scholarship Supplement** provides a supplement of $5000 to a holder of an NSERC Postgraduate Scholarship or Canada Graduate Scholarship. It is renewable for a second year provided the Scholarship continues to be held. Note that this is the fifteenth (**15th**) year this scholarship supplement is awarded by this private firm.

11. Susan Woodbury presenting the Scholarship to Adam Monahan, accepting the prize for Michael Optis

The scholarship supplement is awarded to **Michael Optis**, University of Victoria for his studies on the physical processes that control vertical wind shear in the bottom few hundred metres of the atmosphere with the primary objective of improving wind power prediction.

Eugenie Paul-Limoges, last year's recipient, held only a one-year scholarship. She is not eligible for the second year supplement. She is working on land-atmosphere interactions, namely measuring carbon emissions from a harvested Canada Fluxnet site on Vancouver island in collaboration with Professor Andy Black.





Bye - Bye Montréal!
Au revoir Montréal!

Congratulations on a successful Congress!
Félicitations pour un congrès fructueux!

CMOS Fellows
may be granted to members of the Society who have provided exceptional long term service and support to the Society and/or who have made outstanding contributions to the scientific, professional, educational, forecasting or broadcasting fields in atmospheric or ocean sciences in Canada.


12. Dr. Norm McFarlane and Professor Douw G. Steyn from UBC, happy recipient of a CMOS Fellowship

A Fellow is awarded in 2012 to **Professor Douw G. Steyn**, University of British Columbia, for his outstanding contributions to our understanding of ozone pollution, especially in the Lower Fraser Valley region, for his exemplary contributions to CMOS and his extensive efforts towards improving educational and administrative programs in atmospheric science.

Photos credit: All photographs (1-12) shown in the above section are courtesy of Richard Verret, the CMOS Montréal Congress official photographer, except for photos # 2 and 10.

Remerciement pour les photos: Toutes les photos (1-12) illustrées dans cette section ont été prises par Richard Verret, le photographe officiel du congrès de Montréal de la SCMO, sauf pour les photos # 2 et 10.

Joint 2012 CMOS congress and AMS Numerical Weather Prediction and Weather Analysis and Forecasting conferences

MONTREAL, June 1, 2012 /CNW Telbec/ – The 46th congress of the Canadian Meteorological and Oceanographic Society (CMOS) was held from May 29 to June 1st 2012 in Montréal (Québec) jointly with the American Meteorological Society (AMS) conferences on weather analysis and numerical prediction. More than 700 scientists from 11 countries were present at the event.

In their opening addresses, Mr. Pierre Arcand, Québec Minister of Sustainable Development, Environment and Parks, and Mr. David Grimes, Assistant Deputy Minister and Head of the Meteorological Service of Canada (on behalf of the Federal Minister of the Environment, the Honourable Mr. Peter Kent) emphasized the importance, to several sectors of human activity, of meteorological and climatic conditions whether it be for weather alerts, transport, agriculture, health, energy or land management.

Mr. Grimes, also President of the World Meteorological Organization (WMO), gave the opening presentation. He presented an overview of the links between human activities and the use of meteorological forecasts and climate studies to be able to address such questions. With a continuous growing population, this information becomes increasingly important and needs to be more detailed, reliable and robust. He stressed the importance of providing a sustained support to research on climate and atmospheric sciences to be able to face these problems.

More than 500 scientific papers were presented at the Congress covering many topics on atmospheric and oceanic sciences. A well attended public conference on *Oceans and Climate Change* was presented on Wednesday June 30, from 19:30 to 21:00, by Dr. Denis Gilbert, research scientist at Maurice-Lamontagne Institute of the Department of Fisheries and Oceans. He caught the interest of his audience by presenting the different processes at work in the oceans that are responsible for sea level rise, ocean acidification and other major changes observed in the Arctic.

The invited presentations set the stage for this congress covering a variety of topics such as the emergence of numerical weather prediction and its extension to climate simulations, the use of satellite data to improve the quality of weather forecasts, and better understand variations in the climate or also the complexity of oceans and the mechanisms that impact marine life and consequently, the capacity of the oceans to feed a growing population. The theme for the 2012 congress was *The Changing Environment and its impact on climate, ocean and weather services* and the presentations did highlight the extent to which the society of XXIst century has a growing need for scientific research which helps us to better understand the complex system of the atmosphere and the oceans. The excellence of Canadian scientists in atmospheric and oceanic sciences was evident throughout the week. The Parsons medal of excellence in oceanography was awarded this year to Prof. Louis Fortier, director of ArcticNet at Laval University. The Patterson medal for meteorology was awarded this year to Prof. John Gyakum of the Department of Atmospheric and Oceanic Sciences at McGill University (more information on **pages 127-129**).

Congrès conjoint de la SCMO 2012 avec les conférences de l'AMS sur la Prévision numérique du temps et sur la Prévision et l'analyse météorologique

MONTRÉAL, le 1er juin 2012 /CNW Telbec/ – Le 46e congrès annuel de la Société canadienne de météorologie et d'océanographie s'est tenu à Montréal du 29 mai au 1er juin 2012 conjointement avec les conférences de l'*American Meteorological Society* sur la prévision et l'analyse. Près de 700 scientifiques en provenance de 11 pays y ont participé.

Dans leurs mots de bienvenue, Messieurs Pierre Arcand, ministre québécois du Développement durable, de l'Environnement et des Parcs, et David Grimes, sous-ministre adjoint responsable du Service météorologique du Canada (au nom du Ministre fédéral de l'Environnement, l'honorable Peter Kent) ont souligné l'importance, pour plusieurs secteurs d'activités humaines, des conditions météorologiques et climatiques que ce soit pour les alertes météorologiques, le transport, l'agriculture, la santé, l'énergie ou encore l'aménagement du territoire.

Monsieur Grimes, également président de l'Organisation Mondiale de la Météorologie, a inauguré le congrès comme conférencier invité. Il a brossé un portrait du lien entre ces secteurs d'activité et l'utilisation des prévisions météorologiques et des études sur le climat pour mieux répondre à ces questions. Avec l'augmentation constante de la population, cette information devient de plus en plus importante et elle se doit d'être encore plus détaillée, fiable et robuste. Il a souligné l'importance d'accorder un appui soutenu à la recherche sur le climat et les sciences de l'atmosphère pour être en mesure d'appréhender ces problèmes.

Plus de 500 communications scientifiques ont été présentées lors du Congrès couvrant plusieurs sujets reliés aux sciences atmosphériques, climatiques et océaniques. Une conférence ouverte au grand public, intitulée *Océans et changements climatiques*, a été présentée le mercredi 30 juin de 19h30 à 21h00, par Denis Gilbert, Ph.D, chercheur scientifique à l'Institut Maurice- Lamontagne du ministère des Pêches et Océans. Il a su captiver son auditoire en présentant les différents processus gouvernant les océans responsables de la hausse du niveau de la mer, l'acidification des océans et de plusieurs changements observés récemment dans l'Arctique.

Les présentations des conférenciers invités ont donné le ton à ce congrès en abordant des sujets aussi divers que l'avènement de la prévision météorologique numérique et de son extension aux simulations du climat, l'utilisation des données satellitaires pour mieux prévoir la météo et mieux comprendre les variations du climat ou encore la complexité des circulations océaniques et des mécanismes qui influencent la biologie marine et par conséquent la capacité des océans à nourrir une population grandissante.

Le thème du congrès de 2012 était *l'Environnement en évolution et son impact sur les services pour le climat, les océans et la météo* et les différentes présentations ont bien mis en évidence à quel point la société du XXIe siècle a un besoin grandissant que la recherche scientifique nous aide à mieux comprendre ce système complexe formé par l'atmosphère et nos océans. L'excellence des chercheurs canadiens en sciences de l'atmosphère et en océanographie a été mise en évidence. La médaille Parsons d'excellence en océanographie a été remise cette année à Monsieur Louis Fortier, professeur en océanographie à l'Université Laval et directeur du réseau ArcticNet. La médaille Patterson d'excellence en météorologie a été remise à Monsieur John Gyakum, professeur au Département des Sciences atmosphériques et océaniques de l'Université McGill (voir **pages 127-129**).

Next CMOS Congress in 2013

The next CMOS Congress will be held in Saskatoon, Saskatchewan, May 26 - 30, 2013. The selected theme is "*Bridging Environmental Sciences, Policy and Resource Management*". This congress is organized jointly with the Canadian Geophysical Union and the Canadian Water Resources Association. The Local Arrangements Committee and the Scientific Program Committee are already working on the preparation for the 2013 Congress to welcome you at the Teachers Credit Union Place, Saskatoon's premiere conference centre, and the Hilton Garden Inn, both located in beautiful downtown Saskatoon. Please book these important dates on your 2013 agenda.

Prochain Congrès de la SCMO en 2013

Le prochain congrès de la SCMO se tiendra à Saskatoon, Saskatchewan, du 26 au 30 mai 2013. Le thème choisi est "*Integration des sciences de l'environnnement, de la politique et de la gestion des ressources*". Ce congrès est organisé conjointement avec l'Union géophysique canadienne et l'Association canadienne des Ressources Hydriques. Le Comité organisateur local et le Comité du programme scientifique travaillent déjà à préparer le congrès 2013 pour vous accueillir chaleureusement à Teachers Credit Union Place, le plus important centre des congrès à Saskatoon, et au Hilton Garden Inn, tous deux situés dans le magnifique centre-ville de Saskatoon. Prière d'inscrire ces dates importantes à votre agenda pour 2013.

46th CMOS Congress Photo Memories

Souvenirs photographiques du 46e Congrès de la SCMO

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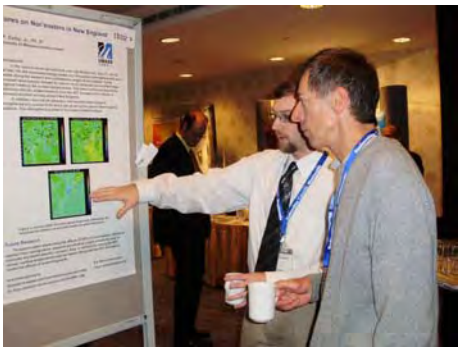

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Photos description on next page with more photos!
Vous trouverez la description des photos à la page suivante avec encore plus de photos!

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Photos legend (from left to right, top to bottom)

1. Publications Committee after their meeting on Monday;

2. **Drs. Richard Asselin** and **Dave Burridge**, plenary speaker from ECMWF;

3. **Bob Jones**, webmaster and **Richard Verrett**, Montréal Congress photographer at Patterson and Parson Lunch;

4. Two Congress participants in discussion at the poster session during health break;

5. When oceanography meets meteorology: **David Greenberg**, oceanographer from Bedford Institute with **Carol Moogk-Soulis,** meteorologist in front of the poster describing her work on high surface temperatures in the city with the appropriate protection required;

6. Professeur **René Laprise** (UQAM) et **Jocelyne Blouin**, présentatrice météorologique retraitée à la télévision de Radio-Canada, heureuse récipiendaire d'une citation de la SCMO;

Magnificient Complexe Desjardins adjacent to the venue of the 2012 Montréal Congress

7. **Diane Houle** and **Norm McFarlane** rejoicing after banquet;

8. **Richard Asselin,** Director of Publications with **Stephen Lambert,** President of Publications Committee;

9. **Craig Smith**,Chair LAC Committee for 2013 Saskatoon Congress, **Sheila Bourque**, AO Technical Editor, and **Virginia Wittrock**, Chair Saskatchewan Centre;

10. **Norm McFarlane**, outgoing President, **Peter Bartello**, incoming President, and **Denis Gilbert**, DFO/IML, Wednesday night's public speaker;

11. Busy dancing floor after banquet with the music played by the Kelvin band, a well-known group of twelve amateur musicians within the CMOS community;

12. Quand l'océanographie rencontre la météorologie: les frères **Lefaivre**, **Denis** (à gauche), océanographe à l'IML et **Louis** (à droite), météorologue retraité et Président du Comité local organisateur du congrès 2012 de Montréal.

Above twelve photos are courtesy of the Editor, *CMOS Bulletin SCMO*, 31 May 2012.

CMOS BUSINESS / AFFAIRES DE LA SCMO

Paul Myers New CNC/SCOR Chair

Dr. Paul Myers: New CNC/SCOR Chair

The new chair of CNC-SCOR is Paul Myers, an Associate Professor (Professor as of July 1, 2012) in the Department of Earth and Atmospheric Sciences at the University of Alberta. Paul is a physical oceanographer who grew up with an interest of the sea from a young age that developed from listening to his grandfather's stories as a deep sea trawler skipper. Many years later and after many years living inland away from the oceans, a developing interest in fluid dynamics and numerical methods gained while obtaining a B. Math degree from the University of Waterloo in 1990 brought Paul back to the oceans. This then led to an M.Sc. from McGill in 1992 and a Ph.D. from the University of Victoria in 1996. After three years working in the United Kingdom at the University of Edinburgh as a postdoctoral research fellow, he returned to Canada to take up a faculty position at Memorial University of Newfoundland, before moving to the University of Alberta in 2001 where he has been since. He has been actively involved in both SCOR and CMOS (locally as well as nationally) over the past decade, being the SCOR Tour Speaker to Eastern Canada in 2011 and the CMOS President in 2007-2008.

Today, Paul's research is a mixture of data analysis as well as numerical modelling. He is interested in the role of freshwater in the North Atlantic, both in terms of observed changes as well as how to properly represent this quantity in numerical models and what those models can tell us of observed variability. Linked to this is a desire for a greater understanding of the links between the Atlantic and the Arctic Oceans, and especially the role that is played by the straits and passageways of the Canadian Arctic Archipelago. He also does some work on the Gulf of Alaska and the North Pacific.

As the new chair of CNC-SCOR, Paul welcomes contact from scientists about concerns in marine sciences and oceanography in Canada that CNC-SCOR might examine and, hopefully, address. [pmyers@ualberta.ca]

Source: Canadian Ocean Science Newsletter, Number 65, June 2012.

Michael Fleet Wins the Eastern Newfoundland Regional Science Fair

The Eastern Newfoundland Regional Science Fair Councill is proud to announce that this year's winner was Michael Fleet of Holy Spirit High School for his project "*A River Runs Through It - Retrofitting the Urban Environment to Reduce Flooding*".

Michael Fleet in front of his exhibit at the Science Fair

Mchael, one of our overall winners, was currently attending the National Fair in Prince Edward Island.

Fiona Cuthbert,
Memorial University, St. John's, NL

Remise du prix Alcide-Ouellet* 2011 de la SCMO à Mario Benjamin du Service météorologique du Canada de la Région du Québec (SMC-Québec)

Le 15 décembre 2011, à un hôtel du centre-ville de Montréal, M. Louis Lefaivre, président du Centre de Montréal de la SCMO, a remis le prix Alcide-Ouellet* 2011 à M. Mario Benjamin. Cette remise de prix a eu lieu devant l'auditoire du SMC-Québec réuni pour la soirée de bureau à l'occasion de Noël 2011.

Mario Benjamin a été reçu météorologue en 1986 et, après quelques années comme prévisionniste, est engagé à la division des Services scientifiques du SMC-Québec, comme spécialiste de la qualité de l'air. Son premier dossier où il s'implique tant du côté technique que comme point de contact avec les partenaires en santé, sera la prévision des UV en 1993. Par la suite, il sera accaparé pendant plusieurs années avec les prévisions de SMOG et de ses précurseurs. En collaboration avec des chercheurs d'Environnement Canada, il participe alors à diverses

campagnes de mesure, telles que NARSTO (North American Strategy on Tropospheric Ozone) en 1996 et MERMOZ en 1997. Cela l'amènera à piloter le programme Info-Smog au Québec et qui deviendra opérationnel en 2001 (hiver) et 2002 (été). Ce travail de précurseur sera finalement transformé en 2007 en un indice de qualité de l'air axé sur les risques sur la santé : la cote air-santé.

Au cours des vingt dernières années, Mario Benjamin a participé directement en tant que scientifique, gestionnaire et porte-parole dans nombre de dossiers qui ont tous comporté un volet communication, que ce soit pour des auditoires spécialisées ou pour le public en général. M. Benjamin a créé, maintenu et enrichi des relations harmonieuses avec ses partenaires municipaux, régionaux, universitaires.

Louis Lefaivre remet le prix Alcide-Ouellet 2011 à Mario Benjamin du SMC-Québec

M. Benjamin a été un contributeur hors pair pour les problématiques reliées à l'ozone stratosphérique. Il a contribué au développement de l'expertise québécoise en qualité de l'air, plus spécifiquement en ce qui a trait aux oxydants troposphériques et à la pollution associée au chauffage au bois en milieu urbain. Il a joué un rôle de pionnier dans le développement et l'implémentation ainsi que la vulgarisation et la communication au grand public d'indices de qualité de l'air tel Info-Smog et la Cote Air-Santé.

Pour toutes ces raisons, Mario se devait d'obtenir le Prix Alcide-Ouellet et c'est avec joie que le Centre de Montréal de la SCMO lui remet le prix cette année.

*Le prix Alcide-Ouellet est attribué à chaque année à un météorologiste s'étant illustré dans la communication, la divulgation et le développement de la météorologie au Québec. Alcide Ouellet (1924-1989) était un météorologue québécois qui, comme chroniqueur-météo à la radio de la SRC pendant plus de 25 ans, a contribué de façon notoire à la vulgarisation de la météorologie au Québec. Ce prix honorifique, autrefois décerné par la défunte "Association professionnelle des météorologistes du Québec", est maintenant attribué par le Centre de Montréal de la SCMO.

* The "Prix Alcide-Ouellet" is awarded annually to a meteorologist having performed in the field of communication, popularization and development of meteorology in Québec. Alcide Ouellet (1924-89) was a Québec meteorologist who, as a radio weatherman at the French-language CBC during more than 25 years, contributed significantly to popularization of meteorology in Québec. This honorary award, once presented by the now disappeared "Association professionnelle des météorologistes du Québec" is now awarded by the CMOS Montréal Centre.

SCEnaRioS: A Science Twinning Project

Youth-Inspired Engagement on Critical Issues of Global Sustainability

A partnership between UNESCO, FIOCRUZ, and ASTC, Inc.

Young people today are eager to employ the most advanced (and often the most fundamental) skills and tools of the information age to raise awareness and inspire action concerning global challenges, particularly those related to sustainability of the planet. These global challenges are the very issues that were addressed by nations from around the world at the latest Earth Summit (Rio+20) in June 2012. And science is at the very heart of the complex deliberations that took place at this Summit.

Science centers and museums have a rich history of leadership in science education and in raising public awareness by engaging communities in informed dialogue around these critical issues. For this reason, the Association of Science Technology Centers (ASTC), in partnership with the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the Fondation FIOCRUZ, launched a new initiative entitled:

SCEnaRioS(**S**cience **C**enters **En**gagement **a**nd the **Rio S**ummit)

A science center twinning project was designed to bring together young people from all over the world to discuss three major topics which were central to the deliberations at the Rio+20 Summit including

- Clean, alternative energies and the green economy;
- Environmentally related health issues;
- Accessibility to clean water, coastal management, and disaster preparedness.

What is SCEnaRioS?

Through the SCEnaRioS program, ASTC helped to partner groups of students ages 15 18 from science centers on varying geographical locations throughout the world. Groups from these partnering centers developed web based tools or resources to address one of the three main topics outlined above. Perspectives on the challenges and opportunities for sustainability varied greatly among these groups. Still, the fundamental premise and guiding principle behind SCEnaRioS was that facilitated, cross cultural and science based discussion of these issues is an extremely valuable step toward achieving mutual respect (and common solutions) for widely varying needs and aspirations for the management of the planet's finite resources.

The goal of the twinning exercise was, first and foremost, to engage the respective local communities in discussion around the topics of the Rio+20 Summit. Four broad subject groups were formed, and the various countries or cities twinned as follows:

1) Sustainable supply and management of clean water;
2) Effects of Climate Change on Florida and the Columbian Andes;
3) Climate Change and its impact on the Environment and Health;
4) Alternative Energies and Lifestyle Changes to reduce energy consumption.

The products of these exercises were then featured at the Summit. On the afternoon of June 19, via live internet video conferencing, each of the participating cities presented its findings through a short video then through a live discussion with the coordinators in Rio and the assembled ministers of the environment from 130 countries. Canada's Hena Masjedee, Anastasia Smolina and Heather Sutcliffe (from Brookfield High School, Ottawa), guided by Jason Armstrong of the Museum of Science and Technology, made an excellent presentation; it can be seen on You Tube at the following address:

http://www.youtube.com/playlist?list=PL6A0904A38EBD5E18&feature=plcp

The videos will further serve as the core of a virtual library containing a variety of online activities and exhibitions aiming to provide science center/museum experience to places in the world that do not yet have such centers.

The results of the various twinning projects were featured during the Rio+20 conference in order to illustrate the unique contributions science centers can make to the implementation of the UN and UN agencies' global policies. The Summit will hopefully serve as an official launch of a comprehensive program to extend the twinning platform concept to a wider and more robust set of communities throughout the world and to focus even more deeply on youth inspired public engagement on these critical issues.

Hena Masjedee, Anastasia Smolina and Heather Sutcliffe, three students at Brookfield High School, Ottawa, receive a CMOS congratulations certificate in the presence of their teacher Paul Saindo.

CMOS SCMO

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Atmosphere-Ocean

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Atmosphere-Ocean Next issue (Vol.50, No.3)

PREFACE

Circulation and Hydrography of Canada's Coastal and Inland Waters

Canada has the longest coastline in the world, with vast continental shelves in the Atlantic, Arctic and Pacific, as well as huge inland freshwater systems across its continent. The coastal and inland waters have diverse ecosystems and ample resources that are vital to Canadians. Monitoring, understanding and predicting the physical variability and trends in Canada's coastal and inland waters have long been priorities for Fisheries and Oceans Canada, Environment Canada and Canadian academia. The demand for knowledge of the physical environment in coastal and inland waters is even more compelling under a changing climate in response to both natural and anthropogenic forcing. There are numerous issues related to the physical environment of coastal and inland waters, such as climate change impacts, aquaculture, pollution and transportation. Every year, the annual Congress of the Canadian Meteorological and Oceanographic Society (CMOS) hosts a theme session "Coastal Oceanography and Inland Waters," with overwhelming contributions and interest from Canadian oceanographers and limnologists. This special section includes five research papers focused on circulation and hydrography. They were originally

presented as part of the Coastal Oceanography and Inland Waters session at the 44th CMOS Congress held in Ottawa in June 2010.

Placentia Bay is located off the south coast of Newfoundland and is host to diverse marine ecosystems, viable commercial fisheries, emerging aquaculture and heavy marine traffic including oil tankers. Because of the heavy marine traffic, the risk of oil spills is high in Placentia Bay. Ma et al. (2012) developed a three-dimensional baroclinic circulation model for Placentia Bay. They showed that the model is able to simulate tides accurately and sub-tidal sea level and currents approximately. The model reproduces well the vertical structure of temperature, the temporal evolution of stratification and the coastal upwelling, which are important physical features having significant implications for the survival and growth of fish larvae in the bay.

The Bay of Fundy has the largest tidal range in the world. This large tidal range always plays a role in flooding events along its coastal region. Greenberg et al. (2012) showed that the tidal range is increasing in the Bay of Fundy, because of the rise in mean sea level in response to climate change. They predicted that the compounding effects of mean sea level rise and the increase in tidal range will lead to a drastic increase in flood risk in the twenty-first century.

The eastern Canadian Shelf is located in the western boundary confluence zone of the North Atlantic between the subpolar and subtropical gyres. The circulation and hydrography in this large shelf system is predominantly influenced by the Labrador Current as part of the subpolar gyre and the Gulf Stream and the North Atlantic Current. Urrego-Blanco and Sheng (2012) investigated the main physical processes governing the interannual variability of circulation using a coupled ice–ocean model. They found varying mechanisms underlying the interannual variability for different regions (e.g., dominant advective effects of high-latitude variability over the Labrador and northern Newfoundland shelves and strong influences of the Gulf Stream in the Slope Water region off Nova Scotia).

The Discovery Islands are located between the British Columbia mainland and Vancouver Island. The region, with its numerous fjords and narrow channels, is characterized by strong tidal currents and prominent wind-driven and freshwater-driven flows. With the development of the salmon aquaculture in the region, there is an increasing need to understand the circulation patterns that affect the dispersion of organisms and pollutants. Foreman et al. (2012) developed a three-dimensional model for this region. The simulation for April 2010 produces accurate tidal elevations and approximate surface tidal currents. It shows that the tidal residual is significant in the mean current, but the wind-driven component is not. The model produced numerous residual and transient eddies that may have important implications for retention of organisms and pollution.

Great Bear Lake, which crosses the Arctic Circle, is one of the polar lakes that are highly sensitive to climate change. Rao et al. (2012) simulated the physical processes affecting the lake temperature and stratification and assessed the climate change impacts on them during the ice-free period using a three-dimensional hydrodynamic model. It predicts an increase in the surface temperature of 0.5° to 2°C between the 1970–2000 base climate and the 2041–70 warming climate. The increase appears to result mainly from the changes in the air–lake temperature gradient and the wind speeds in the warming climate.

Finally, I would like to thank guest editors Jinyu Sheng and Yerubandi R. Rao, the authors, reviewers and staff of *Atmosphere-Ocean* and Taylor & Francis for their contributions to this special section.

Guoqi Han
Editor, *Atmosphere-Ocean*,
Fisheries and Oceans Canada,
St. John's, Newfoundland, Canada

Prochain numéro d'*Atmosphere-Ocean*
(Vol.50, No.3)

PRÉFACE

Circulation et hydrographie des eaux côtières et intérieures du Canada

Le Canada possède la plus longue ligne de côte du monde, avec de vastes plateaux continentaux dans l'Atlantique, l'Arctique et le Pacifique ainsi que d'immenses systèmes intérieurs d'eau douce dans sa partie continentale. Les eaux côtières et intérieures abritent divers écosystèmes et d'importantes ressources qui ont une importance vitale pour les Canadiens. Surveiller, comprendre et prévoir la variabilité physique et les tendances dans les eaux côtières et intérieures canadiennes constituent depuis longtemps des priorités pour Pêches et Océans Canada, Environnement Canada et les milieux universitaires canadiens. Les connaissances sur l'environnement physique dans les eaux côtières et intérieures sont plus en demande que jamais dans le contexte d'un changement climatique résultant d'un forçage tant naturel qu'anthropique. De nombreux enjeux sont liés à l'environnement physique des eaux côtières et intérieures, comme les répercussions du changement climatique, l'aquaculture, la pollution et les transports. Chaque année, la Société canadienne de météorologie et d'océanographie (SCMO) organise une session sur le thème "Océanographie côtière et eaux intérieures", qui suscite un intérêt débordant et attire de nombreuses contributions de la part des

océanographes et des limnologistes canadiens. Cette section spéciale comprend cinq articles de recherche portant sur la circulation et l'hydrographie. Ils ont été initialement présentés dans le cadre de la session *Océanographie côtière et eaux intérieures* au 44e Congrès de la SCMO tenu à Ottawa en juin 2010.

La baie Placentia est située sur la côte sud de Terre-Neuve et abrite divers écosystèmes marins, des pêcheries commerciales viables, une aquaculture en émergence et un trafic maritime important, notamment des pétroliers. En raison du lourd trafic maritime, les risques de déversement d'hydrocarbure sont élevés dans la baie Placentia. Ma et coll. (2012) ont mis au point un modèle tridimensionnel de la circulation baroclinique pour la baie Placentia. Ils ont montré que le modèle est capable de simuler les marées avec précision et de fournir une approximation des courants et des niveaux de la mer durant les cycles de plus d'un jour. Le modèle reproduit bien la structure verticale de la température, l'évolution temporelle de la stratification et les remontées d'eau côtières, qui sont des caractéristiques physiques importantes pouvant influencer de façon marquée la survie et la croissance des larves de poissons dans la baie.

La baie de Fundy connaît la plus grande amplitude de marées du monde. Cette grande amplitude des marées a toujours un rôle à jouer dans les événements d'inondation le long de ses côtes. Greenberg et coll. (2002) ont montré que l'amplitude des marées augmente dans la baie de Fundy par suite de l'élévation du niveau moyen de la mer en réponse au changement climatique. Ils ont prédit que les effets composés de l'élévation du niveau moyen de la mer et l'augmentation de l'amplitude des marées provoquera un accroissement radical des risques d'inondation au cours du XXIe siècle.

L'est du plateau continental canadien est situé à la limite ouest de la zone de confluence de l'Atlantique Nord entre les gyres subpolaire et subtropical. La circulation et l'hydrographie dans ce grand système de plateau continental sont principalement influencées par le courant du Labrador en tant que partie du gyre subpolaire et par le Gulf Stream et le courant de l'Atlantique Nord. Urrego-Blanco et Sheng (2012) ont étudié les principaux processus physiques qui sont à l'origine de la variabilité interannuelle de la circulation à l'aide d'un modèle glace–océan couplé. Ils ont trouvé des mécanismes différents pour expliquer la variabilité interannuelle dans différentes régions (p. ex. des effets d'advection dominants pour la variabilité dans les hautes latitudes au-dessus des plateaux continentaux du Labrador et du nord de Terre-Neuve et de fortes influences du Golf Stream dans la région du talus continental au large de la Nouvelle-Écosse).

Les îles Discovery sont situées entre la partie continentale de la Colombie-Britannique et l'île de Vancouver. La région, avec ses nombreux fjords et ses détroits serrés, est caractérisée par de forts courants de marée et des flux intenses engendrés par le vent et l'eau douce. Avec le développement de la salmoniculture dans la région, il est de plus en plus important de comprendre les configurations de circulation qui régissent la dispersion des organismes et des polluants. Foreman et coll. (2012) ont mis au point un modèle tridimensionnel pour cette région. La simulation pour avril 2010 produit des élévations de marée précises et fournit une approximation des courants de marée en surface. Elle montre que le résidu de marée est important dans le courant principal mais que la composante produite par le vent ne l'est pas. Le modèle a produit de nombreux résidus et tourbillons transitoires qui peuvent avoir une influence importante sur la rétention des organismes et de la pollution.

Le Grand lac de l'Ours, que traverse le cercle arctique, est l'un des lacs polaires particulièrement sensibles au changement climatique. Rao et coll. (2012) ont simulé les processus physiques ayant une influence sur la température et la stratification du lac et ont évalué les répercussions du changement climatique sur ces lacs durant la période interglacielle au moyen d'un modèle hydrodynamique tridimensionnel. Celui-ci prévoit une augmentation de la température en surface de 0,5 à 2 °C entre le climat de base de 1970–2000 et le climat en réchauffement de 2041–2070. L'augmentation semble principalement résulter des changements dans le gradient de température air–lac et les vitesses du vent dans le climat en réchauffement.

En terminant, je voudrais remercier les directeurs scientifiques invités Jinyu Sheng et Yerubandi R. Rao, les auteurs, les réviseurs et le personnel d'*Atmosphere-Ocean* ainsi que Taylor & Francis pour leur participation à cette section spéciale.

Guoqi Han
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BOOK REVIEWS / REVUES de LITTÉRATURE

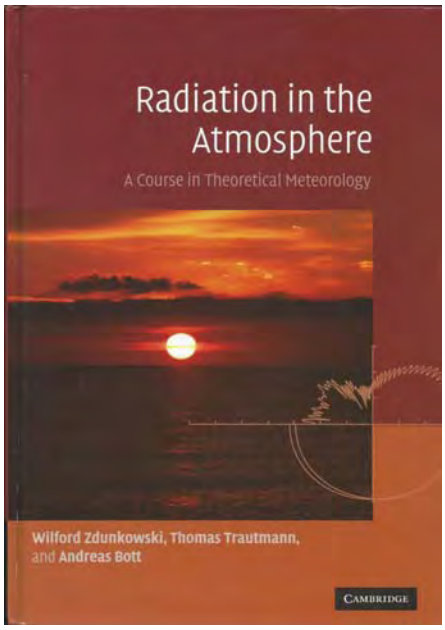
Radiation in the Atmosphere
A Course in Theoretical Meteorology

by Wilford Zdunkowski, Thomas Trautmann, and Andreas Bott

Cambridge University Press, 2011
ISBN 978-521-87107-5, 482 pages, Hardback, US$135

Book reviewed by Daniel Johnston[1]

This is the third book by the authors and it is well written for the intended audience of graduate students, researchers and those in need of a reference book with updated information on radiation. Each chapter is built on previous chapters' knowledge and, therefore, requires a focussed reading of the material presented. Solutions to the end of chapter problems are provided in an appendix for the benefit of the students. The authors decided against representing each physical quantity by a unique symbol and opted to use the standard notation to describe physical quantities. Providing a unique symbol for a physical quantity, such as kB for Boltzmann's constant and kH for Hooke's constant instead of k for both, would have decreased the number of second-readings and would have gone against the authors' audience's knowledge.



The introductory chapter offers a brief outline of atmospheric radiation complete with primary definitions, mathematical equations and concepts. This background information proved imperative during the description of the radiative transfer (RT) equation in chapter two. During the RT equation derivation, multiple references are made to previously derived formulas to ease continued derivation and also to reinforce the most necessary formulas.

Completing the skipped derivations using the end-of-the-book appendices combined with a complete understanding of chapter one's formulas are required for full comprehension of the material presented; such as Kirchoff's Law, Beer's Law, Planck function, azimuthal dependence, upwelling and down welling radiation, radiative flux and local equilibrium. Chapters three and four sufficiently describe the importance of Beer's Law and Lambert's Law during the computation of the RT equation using the matrix operator and the Monte Carlo methods.

After a comprehensive derivation of the Radiative Perturbation Theory, including Rayleigh scattering, the authors in chapter five focused on how to resolve the RT equation in a real-world atmosphere. They compared the effect of cloud droplets and aerosols with lab-derived results applying previous equations with newly introduced ideas such as multiple scattering, absorption and emission. The illustrations in the final sections of this chapter sufficiently explain the RT equation in real-world applications.

The rest of the book focusses on real-world radiation effects by revisiting the previously discussed ideas, introducing new applications and re-working mathematical formulas with the practical applications replacing the theoretical ones. Each chapter is best read in groups of two because of their similar topics and ideas.

Chapters seven and eight focus on molecular collisions. Collisions between molecules cause internal energy changes that can be described by Lorentz broadening in the lower 30km, Doppler broadening above 50 km and a combination of the two between 30 and 50 km above sea level. The authors' descriptions of these collisions utilize Maxwell's velocity distribution, the Ladenburg and Reiche function. Building on these collisions, they also discuss the effects of radiation absorption in the atmosphere. An intense explanation of the most common molecules' role, N_2 and O_2, is completed before describing a more complex molecule such as H_2O. The step-by-step breakdown of this process should provide the student with a real-world application of how the most abundant molecules affect infrared radiation absorption in the atmosphere. Throughout the entire chapter, multiple references are made to the outside texts the authors used for reference so the student can read them for a deeper understanding of the material presented, such as quantum mechanics, instead of the quick and meteorological-focussed definitions and examples.

The authors exhaustively calculate the light scattering for spheres and particles in chapter nine. Mie Theory and Maxwell's equations are combined to obtain light scattering in spheres. Building on these ideas, the authors reintroduce Rayleigh scattering with Maxwell's equations to make calculating light scattering off spherical particles easier.

[1] Pelmorex, Burlington, Ontario, Canada

The authors, in chapter ten, briefly explained the transfer of polarize light in a scattering atmosphere and instructed the student to read published works on the same topic by Hovenier and van der Mee for further clarification and study. The explanation of the three types of polarization, Stokes parameters and various scattering matrices and the vector forms of new and previously introduced ideas reinforces the attention toward real-world applications. Completing the end-of-chapter problems proved difficult without using the authors' recommended book Optics by Eugene Hecht 1987; a minor drawback.

These final two chapters cover remote sensing techniques with the application of Chahine's relaxation method, Smith's iterative inversion method and radiation's role in the chemical composition of the atmosphere to describe the earth's radiative changes. Focussing on clouds' impact of radiation, the authors quickly explain the chemical interactions and clouds' effect on climate models to explain earth's changing climate. These chapters are most useful for operational forecasters.

Scientists, graduate students and researchers with a strong mathematical and theoretical background will most easily comprehend the text's material. I would recommend this textbook for the authors' intended purpose of "*present[ing] a coherent and consistent development of radiative transfer theory as it applies to the atmosphere*". For reference, this text is above the level of Grant Petty's A First Course in Atmospheric Radiation whose audience is upper-level undergraduate and first-year graduate students.

The Cryosphere

by Shawn J. Marshall[2]

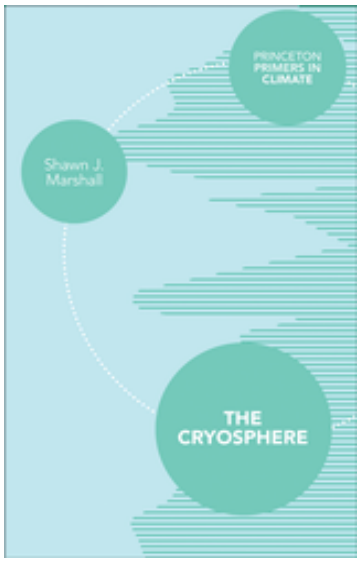
Princeton University Press
ISBN 978-0-691-14526-6, 2012, Paperback, 288 pp, US$24.95

Book Reviewed by Ted Munn[3]

Shawn Marshall is a Canadian who grew up in a small town (Matheson) in Northern Ontario, and in the Preface, he comments that "*he was exceptionally privileged*" to spend his early years in a land "*where he could count on a snow cover from Hallowe'en to Mother's Day*." The book contains 9 chapters, each beginning with a pithy quotation which indirectly suggests that Canadians should appreciate their national inheritance – a very large share of the global arctic.

Chapter 3 begins with: "*The world came into being with the signing of a contract. A scientist calls it the Second Law of Thermodynamics (Annie Dillard wrote this but it sounds as if it had been written by Wagner for his Ring Cycle*.)".

In a similar vein, Chapter 6 begins with a two-liner by Mark Twain: "*One who keeps company with glaciers comes to feel tolerably insignificant by and by*". And inside the front cover is a painting of Ellsmere Island by Lawren Harris. Shawh Marshall is clearly an advocate for the arctic, as well as for the science relating to that part of Canada.



The book is written at the undergraduate level; it covers the cryosphere field in a well balanced and professional way. The book concludes with a glossary, an annotated bibliography and an index. The price is certainly right (US$24.95) but the outside covers of my copy are faint. The Lawren Harris painting is in black and white and so loses its effectiveness as a marker of the text to follow.

Topics in the book that I especially liked:

1. Particular chapters:
- Chapter 1, especially the first two paragraphs (Some basic facts about the cryosphere).
- Chapter 2: The material properties of snow and ice;
- Chapter 7: Permafrost (Did you know that permafrost can sometimes be hundreds of metres thick and tens to hundreds of millennia old? Thus studies of the cryosphere involve time scales of billions of years, or longer).
- Chapter 9: Climate change, especially the subsection on sea level rise.

2. Black ice: This is a phenomenon seen on small lakes in springtime (pg. 91), not the same as the black ice that is a hazard on roads. For example, there is a small lake east of Peterborough where the ice cover suddenly turns black; the next morning, the ice has disappeared. Cottagers have not been able to predict when this will occur.

3. Pytheas: Chapter 5 begins with a paragraph about Pytheas, a Greek geographer and explorer (4th century BC). Pytheas is said to have made a long sea voyage from the Mediterranean through the Strait of Gibraltar and northward into a region where in late June the sun never sets (the Midnight Sun). Pytheas is believed to be the first Greek explorer to visit England and the Baltic, and to describe sea

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ice.

Topics that I wished that the author had included:

1. Sublimation: When a Chinook blows across a flat snow-covered surface in Alberta, how much water is transferred to the atmosphere by evaporation, and how much by sublimation? (How much water does the Chinook transfer to the atmosphere by evaporation and how much by sublimation?)

2. Lake Vostok: This lake is about the size of Lake Erie but there the similarity ends. Lake Vostok is covered by more than 2 km of ice, which has sealed it off from the atmosphere for between 15 and 34 million years. The lake contains fresh water at 3 °C because of the pressure of the ice above. But after a decade of drilling on Feb.9, 2012, a Russian scientific team finally reached fresh water. pushing it 30 to 33m up the drill hole before it froze.

3. A history of environmental research in the Canadian Arctic: Perhaps this is a suggestion for a separate paper or book. I am thinking of the upper atmosphere arctic research by Ken Hare, Sven Orvig and Barney Boville; the role of the Arctic Institute; Canadian participation in the several International Polar Years; etc., etc.

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

Latest Books received / Derniers livres reçus

2011-09) *Principles of Planetary Climate*, by Raymond T. Pierrehumbert, Cambridge University Press, ISBN 978-0-521-86556-2, Hardback, 652pp, US$80.00.

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

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

2011-29) *Engineering Strategies for Greenhouse Gas Mitigation*, Ian S.F. Jones, Cambridge University Press, ISBN 978-0-521-51602-0, Hardback, US$85.00, 170pp.

2011-32) *The Theory of Large-Scale Ocean Circulation*, R.M. Samelson, Cambridge University Press, ISBN 978-1-107-00188-6, Hardback, US$85, 193pp.

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

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

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

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

2012-08) *Dryland Climatology*, by Sharon E. Nicholson, Cambridge University Press, ISBN 978-0-521-51649-5, Hardback, 516 pp, US$150.

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

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

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31 August 2010

After all the rainfalls in June, people from Vancouver will like to remember that August is historically the driest month in Vancouver with an average precipitation of 39.1 mm. 31 August 2010 was the wettest summer day in the city's history. More than 55 mm of rain was recorded at the airport, eclipsing the old mark of 39.4. The downpour was due to a frontal system more typical of fall or winter. But it was good news for firefighers battling forest fires around the province.

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

Prochain numéro du *CMOS Bulletin SCMO*

Le prochain numéro du *CMOS Bulletin SCMO* paraîtra en **octobre 2012.** Prière de nous faire parvenir avant le **5 septembre 2012** vos articles, notes, rapports d'atelier ou nouvelles à l'adresse indiquée à la page 118. Nous avons un besoin URGENT de vos contributions écrites.

BRIEF NEWS / NOUVELLES BRÈVES

Brock University Alumni Association Honoured David Grimes

The Brock University Alumni Association presented David Grimes with an Alumni of Distinction Award on March 31, 2012. He was further honoured by being asked to give a Distinguished Alumni Lecture on the subject of "*Climate Variability and Change: An International Science and Policy Challenge*".

David Grimes

David Grimes, ADM of Meteorological Service of Canada, received the award given to alumni who have made significant contributions to their field of study, which in David's case is the Faculty of Mathematics & Science. The Alumni Association noted that "*David Grimes' early career as a weather forecaster quickly evolved into what has become an extensive career in science and policy management that began with Environment Canada 37 years ago*".

For more than 20 years, David has worked on international initiatives and programs. He has been Canada's permanent representative to the World Meteorological Organization (WMO) since 2006 and was elected president by members of this United Nations organization in 2011.

Congratulations to David for receiving this award from his peers.

L'Association des anciens étudiants de l'Université Brock honore David Grimes

L'Association des anciens étudiants de l'Université Brock a remis à David Grimes le Prix de distinction le 31 mars dernier. Il a également été honoré en étant invité à donner une conférence sur le thème "*Variabilité et changements climatiques :Un défi international pour la science et la politique*".

David Grimes, Sous-ministre adjoint du Service météorologique du Canada, a reçu ce prix décerné aux anciens étudiants qui ont contribué de façon considérable à leur domaine d'études qui, pour David, était la Faculté de mathématiques et des sciences. L'Association a mentionné que "le début de carrière de David Grimes en tant que prévisionniste a rapidement évolué pour devenir une riche carrière en sciences et en gestion des politiques qui a commencé avec Environnement Canada il y a 37 ans".

David travaille depuis plus de 20 ans sur des initiatives et des programmes internationaux. Il est représentant permanent du Canada à l'Organisation météorologique mondiale (OMM) depuis 2006 et il est également le président de l'Organisation, élu par les membres du corps des Nations Unies en 2011.

Nos félicitations à David d'avoir reçu ce prix de la part de ses pairs.

50 Candles!

Fifty candles! Not for a person; neither an event; neither for an institution or organization. But for a book. The book written by Rachel Carson, *Silent Spring*.

Silent Spring is a book written by Rachel Carson and published by Houghton Mifflin on September 27, 1962 The book is widely credited with helping launch the environmental movement.

The New Yorker started serializing *Silent Spring* in June 1962, and it was published in book form (with illustrations by Lois and Louis Darling) by Houghton Mifflin later that year. When the book *Silent Spring* was published, Rachel Carson was already a well-known writer on natural history, but had not previously been a social critic. The book was widely read — especially after its selection by the Book-of-the-Month Club and the New York Times best-seller list — and inspired widespread public concerns with pesticides and pollution of the environment. *Silent Spring* facilitated the ban of the pesticide DDT in 1972 in the United States.

The book documented detrimental effects of pesticides on the environment, particularly on birds. Carson accused the chemical industry of spreading disinformation, and public officials of accepting industry claims uncritically.

Silent Spring has been featured in many lists of the best nonfiction books of the twentieth century. In the Modern Library List of Best 20th-Century Nonfiction it was at #5, and it was at No.78 in the conservative National Review. Most recently, *Silent Spring* was named one of the 25 greatest science books of all time by the editors of Discover Magazine.

"Rachel Carson, who was a quick learner, would be ahead of us in understanding the devastating effects everywhere of stll-rocketing population growth combined with consumption of natual resources, the thinning of the ozone layer, global warming, the collapse of marine fisheries, and, less directly through foreign trade, the decimination of tropical forests and mass extinction of species....On the other hand, the lady from Maryland would take some hope from Earth Summit, the successful Montreal Protocol aimed at the reduction of ozone-thinning chlorofluorocarbons, and the less successful Kyoto Protocol designed to slow climatic warming".

- *Edward O. Wilson*, Afterword, *Silent Spring*, page 363. The naturalist and two-time Pulitzer Prize winner Edward O. Wilson, is one of the most respected authorities in the world on topics related to the conservation of the natural legacy that still exists on the planet. He is the author of *The Future of Life,* a book warning against the massive extinction of species, as well as an epic of hope as humanity stands at a crossroads.

A follow-up book, *Beyond Silent Spring*, co-authored by H.F. van Emden and David Peakall, was published in 1996. The Book-of-the-Month Club edition, includes endorsement by William O. Douglas.

Rachel Carson, *Silent Spring*, Introduction by Linda Lear. Afterword by Edward O. Wilson; A Mariner Book Houghton Mifflin Company, 1962, (ISBN 0-618-25305-x). Source: Wikipédia.

50 Bougies!

Cinquante bougies! Non pas pour une personne; non pas pour un événement; non pas pour une institution ou organisation. Mais pour un livre. Celui de Rachel Carson, *Printemps silencieux*.

Printemps silencieux (*Silent Spring*) est le titre d'un livre écrit par la biologiste Rachel Carson et publié aux États-Unis par Houghton Mifflin en septembre 1962. Ce livre est reconnu pour avoir contribué à lancer le mouvement écologiste dans le monde occidental.

Quand *Printemps silencieux* fut publié, Rachel Carson était déjà connue pour ses écrits sur l'histoire naturelle, mais n'était pas encore connue pour son rôle de critique sociale. Le livre fut un succès (surtout après sa sélection au "Livre du Mois" et le soutien du Juge de la Cour Suprême William O. Douglas). Il resta dans la liste des bestsellers du New York Times pendant plusieurs semaines et provoqua une prise de conscience du public des problèmes liés aux pesticides et à la pollution de l'environnement. *Printemps silencieux* contribua à l'interdiction du pesticide DDT ou Dichlorodiphényltrichloroéthane aux États-Unis en 1972.

L'ouvrage traitait des effets négatifs des pesticides sur l'environnement, et plus particulièrement sur les oiseaux. Rachel Carson déclarait que le DDT s'avérait être la cause de coquilles d'œufs plus fines chez les oiseaux, et occasionnait une hausse de la mortalité ainsi que des problèmes de reproduction. Elle accusait également l'industrie chimique de pratiquer la désinformation, et les autorités publiques de répondre aux attentes de l'industrie chimique sans se poser de questions.

"Printemps silencieux a semé les graines d'un nouveau militantisme, qui est devenu l'une des plus grandes forces populaires de tous les temps.....On peut considérer à bon droit la publication de *Printemps silencieux* comme la naissance du mouvement écologiste".

- *Al Gore*, Préface, *Printemps silencieux*, page 12.

Printemps silencieux apparaît dans de nombreux classements des meilleurs œuvres littéraires hors-fiction du XX^{e} siècle. Il est classé 5^{e} dans la liste Modern Library des meilleurs écrits non romanesques du XX^{e} siècle; et 78^{e} dans le classement de la revue conservatrice National Review. Plus récemment, *Printemps silencieux* fut déclaré comme faisant partie des 25 plus grands ouvrages de tous les temps par l'éditeur du Discover Magazine.

Une suite lui fut donnée dans *Beyond Silent Spring*, un ouvrage co-écrit par H.F. van Emden et David Peakall qui fut publié en 1986.

Rachel Carson, *Printemps silencieux*, préface d'Al Gore, éditions Wildproject, collection "Domaine sauvage", 2009, (ISBN 978-2-918490-00-5); réédition 2011 (ISBN 978-2-2918-490098). Source: Wikipédia.

Four brave ocean robots battled gale force storms to reach Hawaii

The PacX Challenge Wave Gliders have broken the Guinness Book World record for distance by an unmanned wave powered vehicle. Arriving in Hawai'i on the first leg of their 9000 nautical miles journey across the Pacific, they have traveled over 3200 nautical miles breaking the previous world distance record of 2500 nautical miles.

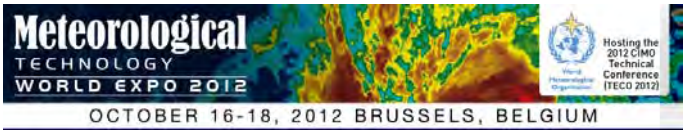
Launched on November 17, 2011 from San Francisco Bay, the Wave Gliders have survived 8-metre waves in a gale force storm, defied turbulent mid-ocean currents, all while transmitting real time ocean data and staying on course to their first destination: the Big Island of Hawaii. After a short check-up, the PacX Wave Gliders will embark on their final journeys to Australia and Japan. During this portion of the record breaking, scientific expedition, the first team of Wave Gliders will cross the Mariana Trench and battle the Kuroshio Current on their way to Japan. The second team will cross the equator on their way to Australia. It is anticipated the arrivals will occur in late 2012 or early 2013.

"We are proud our PacX Wave Gliders have reached their first destination and broken the world record," said Edward Lu, Chief of Innovative Applications at Liquid Robotics. "*I have no doubt new ocean discoveries, insights, and applications will emerge from the PacX data set. PacX represents a new model for providing widespread and easy access to environmental monitoring of the world's oceans, one in which Liquid Robotics operates fleets of mobile, autonomous ocean robots across previously inaccessible areas of the ocean*".

The PacX Challenge Wave Gliders were named to honour famous oceanographers and discoverers. One of the four, Papa Mau or "the Way Finder", was named after the Micronesian navigator, Pius "Mau" Piailug, famous as the teacher of traditional, non-instrument way of finding methods for deep-sea voyaging. True to his spirit, his namesake Wave Glider is navigating to port without instruments, due to a satellite communication disruption. Programmed to go straight to Kawaihae Harbour on the Big Island, he is battling severe currents, yet staying on path using only his original coordinates and the stars!

PacX Challenge Wave Gliders are manufactured by Liquid Robotics. Liquid Robotics and Wave Glider are registered trademarks of Liquid Robotics, Inc., in the United States and other countries.

2012 Meteorological Technology World Expo



Meteorological Technology World Expo is a truly international exhibition of the very latest climate, weather and hydrometeorological forecasting, measurement and analysis technologies and service providers for a global community of key decision makers within the aviation industry, shipping companies, marine/port installations, airports, military operations, off-shore exploration companies, wind farm operators, met offices, agriculture operations and research institutes. The Expo will take place in Brussels, Belgium, October 16-18, 2012.

Meteorological Technology World Expo 2012 looks set to be almost twice the size of the launch event with around 180 exhibitors!

If you are looking for new measurement, forecasting and analysis technologies, weather or research service providers, or simply to meet up with your established suppliers in one convenient location, Meteorological Technology World Expo is the place to be.

Please note that Meteorological Technology World Expo is free to attend for any Met professional.

WMO Volunteers Program

The World Meteorological Organization (WMO) Secretariat is conducting a survey to determine whether there is a sufficient pool of skilled candidates available to participate in the WMO Volunteers International
(WVI).

WMO Volunteers International is an initiative of the WMO community to create a network of skilled volunteers to support initiatives in developing and least-developed countries, as well as offer timely support in emergency situations. This network of volunteers will work with the National Hydro Meteorological Services to share knowledge, develop sustainable skills and build institutional capacity.

To learn more about the WMO Volunteers International and to help the WMO determine if there are enough potential volunteers to support the program, please take a few minutes to respond to this survey:

https://docs.google.com/spreadsheet/viewform?formkey=dFpYQWhVWFZxWDRvWXVDVmJmTllmZFE6MA

Note from the Editor: Note above recived on June 9 from COMET, one of the Exhibitors at the Montreal CMOS Congress.

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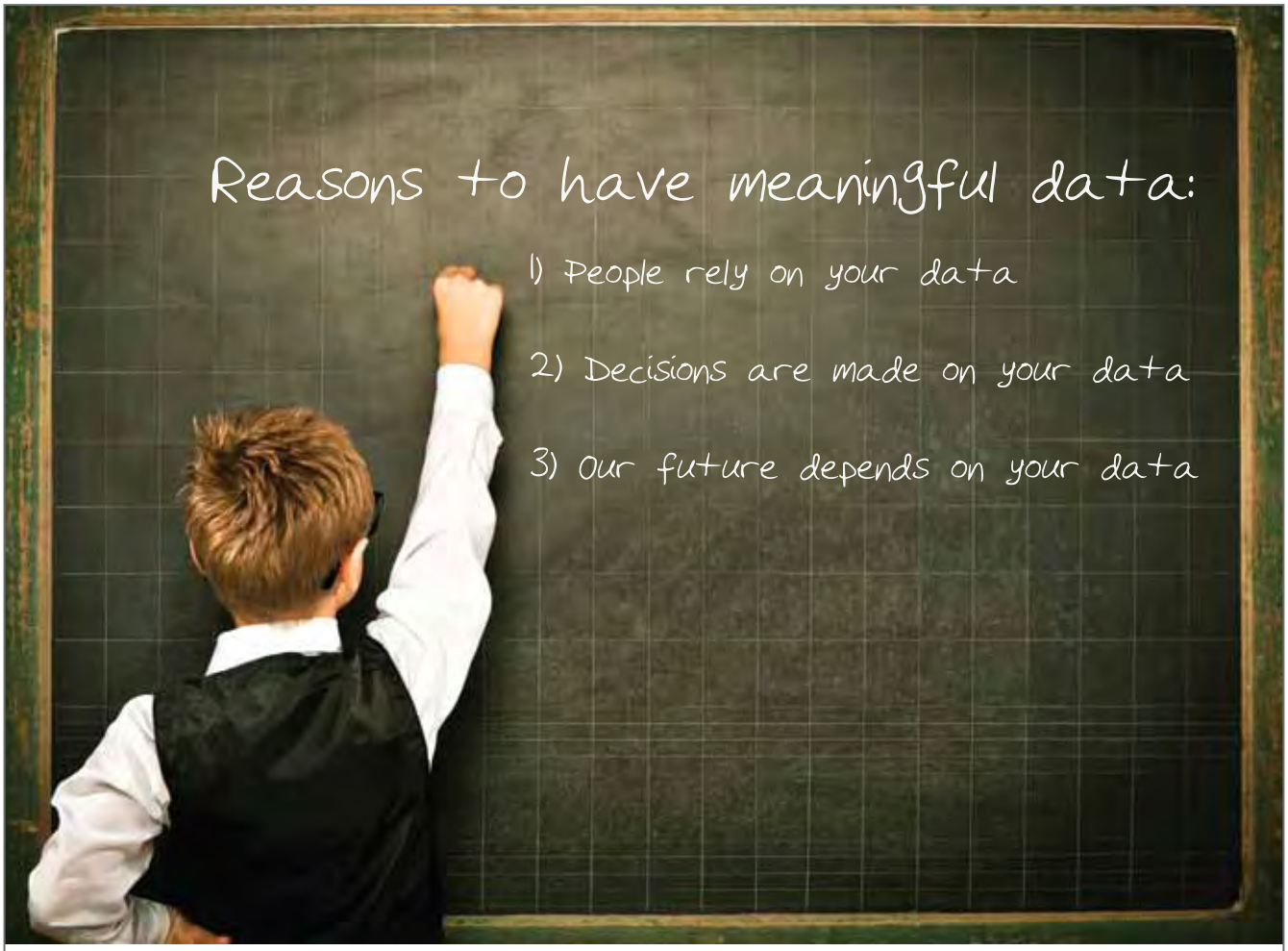
Canadian Water Resources Association
Association Canadienne des Ressources Hydriques

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

Canadian Geophysical Union
Union Géophysique Canadienne



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