



Canadian Meteorological  
and Oceanographic Society

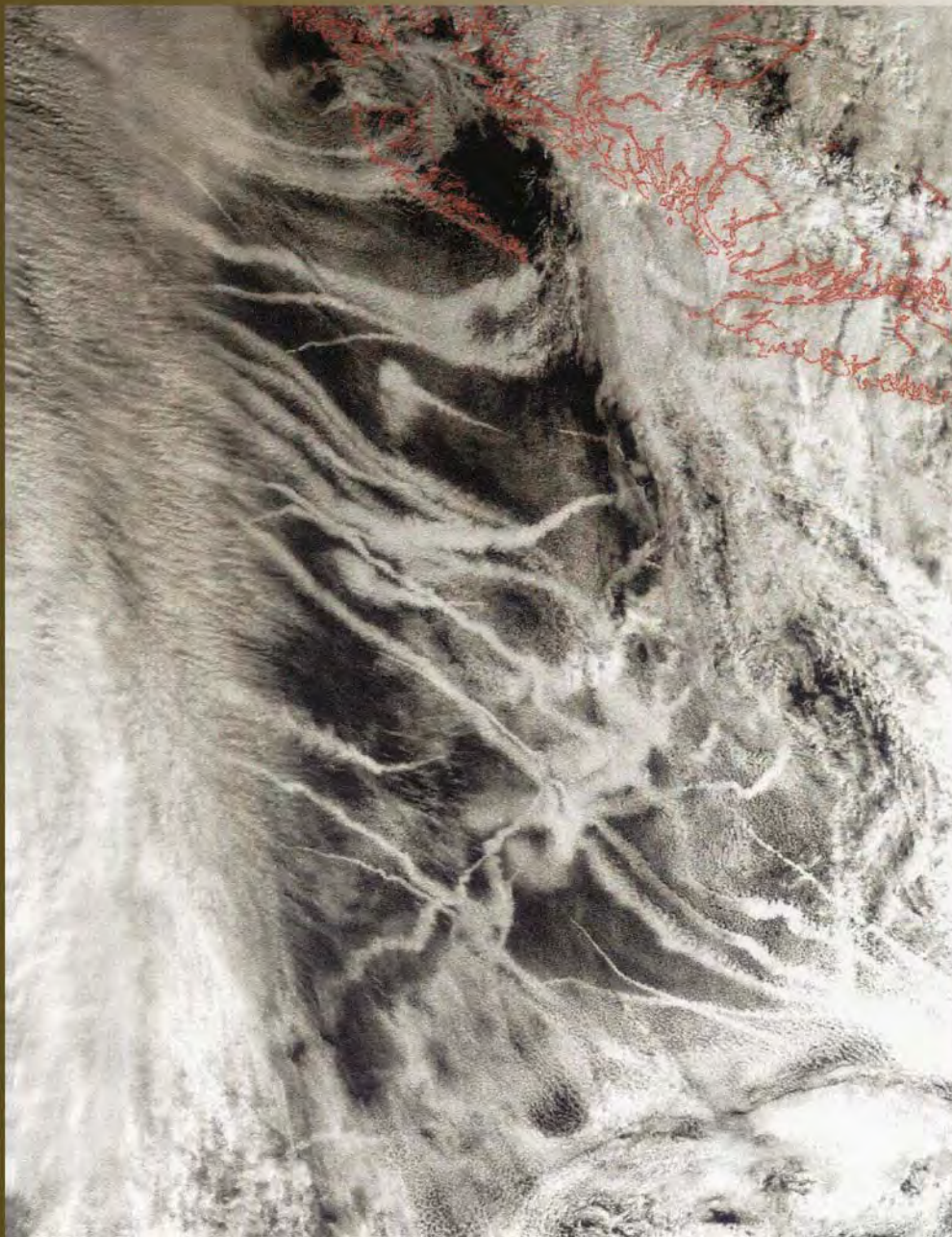
La Société canadienne  
de météorologie et  
d'océanographie

# CMOS **BULLETIN**

**SCMO**

February / février 2006

Vol.34 No.1



**Guess  
What  
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Is ?**

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## CMOS Bulletin SCMO

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

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**Answer to the cover page question :** This image from the European satellite imager MERIS on 5 December 2005 shows a large area off the west coast of Canada and the US, where cloud nuclei in ship exhaust from high sulfur marine fuels have formed lines of low cloud. The MERIS instrument swath is 1200 km wide. The coastline (shown in red) on the image shows the Queen Charlotte Islands and Vancouver Island. The lines last for up to a day, growing slowly in width. Climatic effect of this cloud seeding is estimated to be small, and will tend to oppose global warming. Such images show a very clear example of how fossil-fuel burning can have a visible effect on the earth as seen from space. This satellite image from the European Space Agency was first noted by Stephanie King, who works in Jim Gower's Remote Sensing Laboratory at the Institute of Ocean Sciences, Sidney, BC, Fisheries and Oceans Canada. ([Gowerj@pac.dfo-mpo.gc.ca](mailto:Gowerj@pac.dfo-mpo.gc.ca))

**Réponse à la question de la page couverture:** Cette image captée par le satellite d'imagerie européen MERIS le 5 décembre 2005 montre une vaste région au large de la côte ouest du Canada et des ÉU, où les nucléi de condensation provenant de bateaux utilisant du carburant marin à haute teneur en soufre ont formé des lignes de nuages bas. La largeur de la fauchée de l'instrument MERIS est de 1200 km. Le trait de côte (en rouge sur l'image) montre les îles de la Reine Charlotte et de Vancouver. Les lignes durent jusqu'à un jour, s'élargissant lentement. On estime que l'effet de cet ensemenement de nuage sur le climat est faible et contraire au réchauffement global. De telles images démontrent très clairement que la combustion de carburant fossile a un effet visible sur la terre, vue de l'espace. Stephanie King, qui travaille dans le laboratoire de télédétection de Jim Gower à l'Institut des sciences de la mer de Pêches et Océans Canada, à Sidney, BC, fut la première à remarquer cette image de l'Agence spatiale européenne. ([Gowerj@pac.dfo-mpo.gc.ca](mailto:Gowerj@pac.dfo-mpo.gc.ca))

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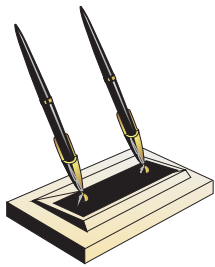
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## ...from the President's Desk

CMOS friends and colleagues:



We have had interesting email discussions and teleconferences regarding the proliferation of weather-related articles in our national and local newspapers and magazines. Several CMOS members have taken exception to the way that our science is being portrayed by a number of reporters, scientists and weathercasters. Some were disconcerted about a MACLEAN'S Magazine article that dubbed our own David Phillips as *Canada's 'Chicken Little'* while others were offended by the Dec. 12<sup>th</sup> Ottawa Citizen article titled "We now know what we don't know about climate change" by Tad Murty and felt that it went "way beyond scientific credibility." Still others have voiced their concern about TV "weathermen" doing "clown tricks" and using questionable weather graphics with "warm fronts moving south" and other nonsensical things. CMOS doesn't have a committee that evaluates and responds to these sorts of issues. Nor do we have the funds to hire someone with media/marketing experience who could help us to deliver a message to the public. As we continue to discuss the vision for CMOS in the future, we would be very interested in **your opinions** about the role CMOS should take, if any. *Are there steps that could be taken by our Society to advance the public image of meteorology in Canada?* Please write me at [president@cmos.ca](mailto:president@cmos.ca) with your ideas.

On a more positive note, I encourage you to nominate a colleague for a CMOS prize or award. Although the February 15<sup>th</sup> deadline for some awards may have passed by the time that you receive this, there is still an opportunity to nominate candidates for CMOS Fellow or for the Neil J. Campbell Medal (deadline March 15<sup>th</sup>).

Let's make the CMOS congress in Toronto May 29 to June 1, 2006 an event to remember! The organizing committee has been working feverishly to prepare a stimulating week of science and entertainment. Encourage your friends, colleagues and students to submit abstracts and to register for the Congress. This can be done through the first link on the CMOS web site.

Here are some highlights from the December Council meeting:

1) Council approved the formation of an Ad Hoc Flight Service Specialist Accreditation Committee to develop Terms of Reference for a permanent committee and a CMOS accreditation program for FSSs. The committee will be chaired by Ron Bianchi.

*(Continued on next page / Suite à la suivante)*

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... from the President's desk (Continued / Suite)

2) Council approved the upgrading of the existing Ad Hoc Finance and Investment Committee to a full Council-Appointed Committee and approved its Terms of Reference.

3) Council approved the formation of an Ad Hoc Student Committee and its Terms of Reference.

Your Executive, Council and National Headquarters are working very hard on your behalf to promote meteorology and oceanography in Canada. Let us know if we can help you in your personal efforts to do the same.

With best regards,

Susan Woodbury, ACM, FCMOS  
President / Présidente

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### Books in search of a Reviewer Livres en quête d'un critique

*The High-Latitude Ionosphere and its Effects on Radio Propagation*, by Robert Hunsucker and John Hargreaves, Cambridge University Press, Hardback, 0-521-33083-1, US\$140.00.

*Flood Risk Simulation*, by F.C.B. Mascarenhas, co-authored with K. Toda, M.G. Miguez and K. Inoue, WIT Press, January 2005, ISBN 1-85312-751-5, Hardback, US\$258.00.

*Sounds in the Sea, From Ocean Acoustics to Acoustical Oceanography*, by Herman Medwin and colleagues, Cambridge University Press, July 2005, ISBN -0521-82950-X, Hardback, US\$100.00.

*Baroclinic Tides, Theoretical Modeling and Observational Evidence*, by Vasily Vlasenko, Nataliya Stashchuk and Kolumban Hutter, Cambridge University Press, July 2005, ISBN 0-521-84395-2, Hardback, US\$120.00.

*The Gulf of Alaska, Biology and Oceanography*, by Phillip R. Mundy, Editor, Published by Alaska Sea Grant College Program, University of Alaska at Fairbanks, 2005, ISBN 1-56612-090-X, Paperback, US\$25.00.

*Safeguarding the Ozone Layer and the Global Climate System, Issues Related to Hydrofluorocarbons and Perfluorocarbons*, by Intergovernmental Panel on Climate Change, Cambridge University Press, October 2005, ISBN 0-521-68206-1, Paperback, US\$70.00.

*Climate Change and Africa*, Edited by Pak Sum Low, Cambridge University Press, August 2005, ISBN 0-521-83634-4, Hardback, US\$150.00.

If you are interested in reviewing one of these books for the *CMOS Bulletin SCMO*, please contact the Editor at the e-mail address provided below. Of course, when completed, the book is yours. Thank you in advance for your collaboration.

Si vous êtes intéressés à faire la critique d'un de ces livres pour le *CMOS Bulletin SCMO*, prière de contacter le rédacteur-en-chef à l'adresse électronique mentionnée ci-bas. Bien entendu, le livre vous appartient lorsque vous avez terminé la critique. Merci d'avance pour votre collaboration.

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### Next Issue *CMOS Bulletin SCMO*

Next issue of the *CMOS Bulletin SCMO* will be published in **April 2006**. Please send your articles, notes, workshop reports or news items before **March 10, 2006** to the address given on page ii. We have an URGENT need for your written contributions.

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### Prochain numéro du *CMOS Bulletin SCMO*

Le prochain numéro du *CMOS Bulletin SCMO* paraîtra en **avril 2006**. Prière de nous faire parvenir avant le **10 mars 2006** vos articles, notes, rapports d'atelier ou nouvelles à l'adresse indiquée à la page ii. Nous avons un besoin URGENT de vos contributions écrites.

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## WMO Statement on the Status of Global Climate in 2005 \*\*\*

**Résumé:** Selon l'Organisation Météorologique Mondiale (OMM), la température moyenne à la surface du globe en 2005 est actuellement de +0,48 °C par rapport à la normale calculée pour la période 1961-1990 (14 °C), d'après les relevés des pays membres de l'organisation. À ce jour, 2005 se place au deuxième rang des années les plus chaudes depuis 1861, date du début des relevés, et il est probable que cette année fera partie des quatre années les plus chaudes qu'ait connues l'humanité depuis cette date, mais les chiffres officiels ne seront publiés que début 2006. L'incertitude afférente à la moyenne mondiale des températures, qui découle essentiellement des lacunes du réseau d'observation, est telle que 2005 pourrait être l'année la plus chaude mais pourrait aussi se placer au huitième rang des années les plus chaudes depuis le début des relevés. À l'exception de 1996, les dix dernières années (1996-2005) font partie des années les plus chaudes jamais observées. Le record est toujours détenu par 1998, année où la température globale en surface était supérieure de +0,54 °C à la moyenne relative à la même période de 30 ans.

Calculées séparément, les températures globales en surface dans l'hémisphère Nord (0,65 °C au dessus de la moyenne), et dans l'hémisphère Sud (0,32 °C au dessus de la moyenne), en 2005, devraient occuper respectivement le premier et le quatrième rang des températures les plus élevées depuis le début des mesures instrumentales en 1861.

À l'échelle du globe, les mois d'octobre et de juin 2005 ont été les plus chauds qui aient jamais été observés, dépassant respectivement les records établis par octobre 2004 et juin 1998. Des températures nettement supérieures à la normale ont été constatées dans de vastes régions, en Afrique, en Australie, au Brésil, en Chine et aux États-Unis d'Amérique, et elles ont été aussi particulièrement élevées dans l'Atlantique Nord et la partie tropicale de l'océan Indien, ainsi que dans le golfe de l'Alaska. Les températures de surface de la mer en 2005 dans l'Atlantique Nord pulvériseront probablement tous les records. Au Canada, la pluviométrie a été la plus forte de l'histoire. Voir le communiqué de presse # 743 de l'OMM à <http://www.wmo.ch>

GENEVA, 15 December (WMO) — The global mean surface temperature in 2005 is currently estimated to be +0.48 °C above the 1961-1990 annual average (14 °C), according to the records maintained by Members of the World Meteorological Organization (WMO). 2005 is currently the second warmest year on record and 2005 is likely to be among the warmest 4 years in the temperature record since 1861, but official figures will not be released until February. The year 1998 remains the warmest year, with optimum averaged surface temperatures averaging +0.54 °C above the same 30-year mean. The uncertainty in the global temperature values, arising mainly from gaps in data coverage, are such that 2005 could be the warmest year or the eighth warmest year on record. The last 10 years (1996-2005), with the exception of 1996, are the warmest years on record.

Averaged separately for both hemispheres, 2005 surface temperatures for the northern hemisphere (0.65 °C above 30-year mean) are likely to be the warmest and for the southern hemisphere (0.32 °C above 30-year mean), the fourth warmest in the instrumental record from 1861 to the present.

Globally, October 2005 was the warmest October on record, surpassing that of last year and June 2005 was the warmest June, surpassing that of 1998. Areas of significant warmth were widespread with large areas of Africa, Australia, Brazil, China and the United States showing significantly above-average temperatures. Much of the North Atlantic and tropical Indian Ocean were also significantly warm, along with the Gulf of Alaska. Sea-surface temperatures in the North Atlantic in 2005 are likely to be the warmest on

record.

The large-scale climate phenomenon El Niño can contribute to above-average warmth, as was the case with extremely strong 1997/1998 episode. But the weak El Niño conditions in the equatorial Pacific Ocean that developed in 2004, faded quickly to near-neutral conditions by March 2005 and little impact on global temperatures occurred.

Since the start of the 20<sup>th</sup> century, the global average surface temperature has risen between 0.6 °C and 0.7 °C. But this rise has not been continuous. Since 1976, the global average temperature has risen sharply, at 0.18 °C per decade. In the northern and southern hemispheres, the 1990s were the warmest decade with an average of 0.38 °C and 0.23 °C above the 30-year mean, respectively.

### Regional temperature anomalies

For Australia, preliminary data indicate that 2005 will be the hottest year since records commenced in 1910, with around 97 per cent of the continent experiencing above-average mean temperatures. During the January-May period, the hottest maximum temperatures on record exacerbated the exceptionally dry conditions. Nationwide temperatures during the first five months of the year were 1.75 °C above normal, surpassing the previous record by a substantial 0.57 °C. In India, Pakistan and Bangladesh, extremely harsh heat waves in May and June brought maximum temperatures of between 45 °C and 50 °C. The delayed south-west monsoon rains allowed the heatwave to persist into June, claiming at least 400 lives in India. A severe heatwave gripped the south-western United States from early to mid-July, setting up numerous temperature records.

Central Canada experienced its warmest and most humid summer on record. In China, the 2005 summer seasonal temperature was one of the warmest since 1951. Severe heat wave conditions also affected much of southern Europe and North Africa during July. In Algeria, the heatwave in July pushed temperatures as high as 50 °C. Extremely cold temperatures affected much of the Balkan region during the first half of February. In Morocco, a cold wave in January dropped temperatures as low as -14 °C.

#### **Prolonged drought in some regions**

Long-term drought continued in parts of the Greater Horn of Africa, including southern Somalia, eastern Kenya, south-eastern Ethiopia, north-eastern Tanzania and Djibouti. The rainy season (March-June) brought below-normal precipitation over this region. Sporadic rainfall during the 2004/05 rainy season caused serious shortfalls in the cereal harvest in Zimbabwe, Malawi, Angola and Mozambique. At least 5 million people in Malawi were threatened with hunger arising from the worst drought in a decade.

Multi-month drought conditions also affected much of western Europe during July, August and September. During the period October 2004 to June 2005, rainfall was less than half the normal in areas of the United Kingdom, France, Spain and Portugal. In France, western parts were most acutely affected. Neighbouring Spain and Portugal experienced the worst drought conditions since the late 1940s and the dry conditions aggravated wildfires.

The period January to May 2005 was exceptionally dry for much of Australia with 44 per cent of the continent experiencing rainfall in the lowest 10 per cent of the recorded totals. During this period, Australia received an average of only 168 mm of rainfall, the second lowest January - May total since records commenced in 1900.

Across the United States, moderate-to-severe drought persisted throughout parts of the Pacific North-West eastward into the northern Rocky Mountains. At the end of winter, moderate-to-extreme drought affected 72 per cent of the Pacific North-West. Below-normal rainfall since December 2004 caused severe drought conditions over southern parts of Brazil, where corn and soybean crops were severely damaged. In Brazil, the southernmost state of Rio Grande do Sul, which is one of Brazil's most prolific agricultural states, was the worst affected; the state of Amazonas experienced the worst drought in nearly 60 years, resulting in record low water levels in the Amazon River.

#### **Heavy precipitation and flooding in many other regions**

The south-west monsoon during June-September brought unprecedented heavy rain and widespread massive flooding to parts of western and southern India, affecting more than 20 million people and resulting in more than 1800 deaths. On 27 July, Mumbai (Bombay) recorded unprecedented heavy rainfall of 944 mm in the previous 24 hours, which is an all-time 24-hour rainfall record for the city. After a near-normal south-west monsoon, heavy rainfall continued

unabated in southern parts of India. The associated devastating floods affected more than 2 million people with at least 200 fatalities. Heavy rains in October caused disastrous flooding also in northern Bangladesh and in Viet Nam. During the third week of June, consecutive heavy rainstorms in parts of southern China killed at least 170 people and affected about 21 million. During early and middle July, heavy rainstorms affected the upper reaches of the Huaihe River Basin.

Persistent heavy rains during the period May-August led to destructive flooding in eastern Europe, particularly in Romania, Bulgaria and Hungary, causing damage to property, infrastructure and agriculture. Torrential rainfall in mid-August also flooded sections of Switzerland, Austria and southern Germany and the Czech Republic. The hardest hit area was Romania where 66 flood-related fatalities and losses of at least US\$ 1.9 million in damage were reported. During April and May, floods and landslides were widespread in southern parts of Russia, affecting more than 4000 people.

An onslaught of winter storms in early January brought exceptionally heavy rain, snow and flooding to the south-western United States. Los Angeles (California) had its second wettest rain fall season on record. During January, a major winter snowstorm, affected areas of the north-eastern United States with more than 30 cm of snow accumulation. Record rainfall occurred in the north-east United States in the autumn of 2005, with three storm systems affecting the region in October. Heavy flooding from rain also created huge economic losses across Canada. In June, three major rain events in southern Alberta produced the costliest natural disaster in the province's history. Across Canada, 2005 was the wettest year on record.

In New Zealand, the Bay of Plenty floods in May were phenomenal with unprecedented heavy rains, which caused widespread damage in parts of Tauranga. Heavy rains affected drought-stricken areas of eastern Australia from mid to late June, producing flooding across south-east Queensland and the far north of New South Wales.

Heavy rains in January and February caused massive flooding in Guyana's capital, Georgetown, and surrounding areas affecting more than 290 000 people. In February, at least two weeks of heavy rainfall in Colombia and Venezuela caused river flooding and landslides that resulted in the deaths of at least 80 people.

Cold weather and heavy snowfall that began in January continued in February over south-west Asia, causing avalanches. In parts of Tajikistan, two metres of snow accumulated in two weeks. During February, sections of northern Pakistan and neighbouring areas of northern India received heavy snowfall, described as the worst in two decades. In India, at least 230 people died as a result of the extreme winter weather. In Pakistan's north-west province, 360 deaths in February were attributed to flooding,

landslides and avalanches. Heavy rains during March also caused flooding in parts of western Pakistan and Afghanistan, resulting in more than 200 fatalities.

#### **Record number of deadly hurricanes**

The 2005 Atlantic Hurricane season brought an unprecedented 26 named tropical storms that caused devastating losses across Central America, the Caribbean and the United States. Fourteen of the named storms were hurricanes. Seven of those were "major" hurricanes (category three or higher on the Saffir-Simpson scale). On average, 10 named storms develop in the Atlantic Basin, six of which are hurricanes. The 2005 hurricane season broke the previous record for the most named storms (21 storms in 1933) and for the most hurricanes (12 in 1969). Since 1995, there has been a marked increase in the annual number of tropical storms in the Atlantic Basin, due to a cyclic pattern. In Central America and the Caribbean region, most damage occurred from Hurricanes *Dennis*, *Emily*, *Stan*, *Wilma* and *Beta*. Seven storms including four hurricanes made landfall in the United States. Hurricane *Katrina* was the deadliest hurricane to affect the United States since 1928. The storm killed at least 1 300 people, mostly in the southern states of Louisiana and Mississippi and produced widespread devastation along the central US Gulf coast. Hurricane *Wilma* was the most intense Atlantic Hurricane ever recorded.

Conversely, in the eastern North Pacific, activity was below average. Fifteen named storms developed during the year, compared to the average of 16 and there were fewer strong storms. Of those 15 storms, seven reached hurricane strength and two reached "major" status. In the North-west Pacific, 23 named storms developed: the average number is 27. Thirteen of them reached typhoon intensity. Typhoon *Talim* crossed south-eastern China and caused serious damage, including at least 150 deaths. In early September, typhoon *Nabi* caused severe damage, and brought a record heavy precipitation of 1 321 mm in three days in western Japan. Typhoon *Longwang*, which caused flash floods, was responsible for at least 80 deaths in south-east China. Tropical cyclone *Ingrid*, which lasted from 5 to 16 March, was the first cyclone recorded to reach intensity of Category 5 off three different Australian states (Queensland, Northern Territory, and Western Australia).

#### **Greater ozone depletion in the Antarctic and Arctic**

This year, the size of the Antarctic ozone hole was close to 2003 values and well above the 1995-2004 average. The maximum size of the Antarctic ozone hole (24.4 million km<sup>2</sup>) was reached in the third week of September. The ozone hole in 2005 dissipated earlier than usual, in mid-November. Based on satellite observations, the ozone hole of 2005 ranks as the third largest ever recorded after 2000 and 2003. This year, greater ozone depletion took place in the Arctic. During the spring of 2005, in large portions of the Arctic region, average values of total ozone were 30-45 per cent lower than comparable values during the early 1980s.

#### **Arctic sea-ice decline intensifies**

Typically, September is the month with the least sea-ice extent in Arctic. By the end of September 2005, Arctic sea-ice extent dropped far below the average for the fourth consecutive year. It was about 20 per cent less than the 1979-2004 average, the lowest extent ever observed during the satellite record since 1979. Satellite information suggests a general decline of 8 per cent in end-of-September Arctic sea-ice extent over the last two and a half decades. Warmer-than-average Arctic temperatures and an early arrival of the sea-ice melt season are the main causes for the intensification of sea-ice decline in 2005.

#### **Information sources**

This preliminary information for 2005 is based on observations up to the end of November from networks of land-based weather stations, ships and buoys. The data are collected and disseminated on a continuing basis by the National Meteorological and Hydrological Services of WMO Member countries.

It should be noted that, following established practice, WMO's global temperature analyses are based on three different datasets. These include the annual optimally averaged global and hemispheric data series, maintained by the Hadley Centre of the Met Office, UK, from which the official rankings are sourced. The other two data sets are the combined dataset maintained by the Hadley Centre of the Met Office, UK, and the Climatic Research Unit, University of East Anglia, UK, from which the latest values are derived, and a dataset maintained by the USA Department of Commerce's National Oceanic and Atmospheric Administration (NOAA). Results from these two datasets are comparable.

More extensive, updated information will be made available in the annual WMO statement on the status of the Global Climate in 2005, to be published in early March 2006.

(\*\*A joint Press Release issued in collaboration with the Hadley Centre of the Met Office, UK, the Climatic Research Unit, University of East Anglia, UK and in the USA: NOAA's National Climatic Data Centre, National Environmental Satellite and Data Information Service and NOAA's National Weather Service. Other contributors are WMO Member countries: Argentina, Australia, Canada, China, Fiji Islands, France, Germany, India, Japan, Mauritius, Morocco, New Zealand, Norway and Sweden).

Source: WMO Website <http://www.wmo.ch> on December 20, 2005. WMO Press Release # 743.

*The World Meteorological Organization is the United Nations System Authoritative Voice on Weather, Climate and Water.*

# A Brief to the House of Commons Standing Committee on Finance

by the Canadian Consortium for Research

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## Under the Chair of the Chemical Institute of Canada

September 2005

### Part 1 - Introduction

The Canadian Consortium for Research (CCR) is a coalition of 15 national organizations representing over 500,000 individuals on the front lines of research and study in Canada. Our members are from the public and private sectors and engage in basic and applied research, study and practice in the natural sciences, social sciences and humanities. The working experience of our members has informed the Consortium's deliberations and shaped our recommendations to the Committee.

Our advice is straightforward. To build a dynamic and productive economy - one in which Canadians enjoy the best quality of life and the highest possible standard of living - the federal government must significantly increase its spending to support:

- the core operations of post-secondary institutions through a dedicated transfer;
- the federal research granting agencies; and
- its own research infrastructure.

### Part 2 - Recommendations

#### **Recommendation 1 – Increase Funding for the Core Operating Costs of Post-secondary Education Institutions through the Creation of a Dedicated Federal/Provincial Transfer**

Post-secondary education institutions are the cornerstones of a modern, productive economy. They play a central role in the creation of new knowledge and the preparation of our next generation of researchers. Yet, by any measure, government support, both federal and provincial, for the core operations of the post-secondary sector, is woefully inadequate. Estimates based on Department of Finance Fiscal Reference Tables indicate a 40% real per capita decline in federal cash support for post-secondary education between 1992 and 2004. Provincial support over the same period declined 8.6%. The result is a university and college system starved for cash. Ontario, for example, ranked 59<sup>th</sup> out of 60 North American jurisdictions in 2004 in per capita spending on post-secondary education. That placed it ahead of only Tennessee. In practical terms this funding shortfall undermines quality and accessibility by driving tuition fees higher, increasing teacher/student ratios,

increasing dependence on part-time faculty and forcing institutions to turn to special interest groups for money.

Educational opportunities for students at both the undergraduate and graduate levels are suffering. The physical infrastructure – libraries, laboratories, buildings and grounds - of universities and colleges is also under threat. The most recent estimates (2001) of the Canadian Association of University Business Officers (CAUBO) set deferred maintenance costs in the university sector at \$3.6 billion.

<b>Canadian Consortium for Research Steering Committee Members</b>
Canadian Association of Physicists (CAP)
Canadian Association of University Teachers (CAUT)
Canadian Federation for the Humanities and Social Sciences (CFHSS)
Canadian Federation of Biological Societies (CFBS)
Canadian Psychological Association (CPA)
Chemical Institute of Canada (CIC)

Correcting this funding shortfall will contribute significantly to improving Canada's economic productivity and improving the lives of future generations. The federal and provincial governments must recognize their mutual responsibility, set aside their differences and create a dedicated federal/provincial transfer to fund the core operations of post-secondary education. To be successful the transfer must:

- be governed by nationally established principles ensuring accessibility, quality and academic integrity;
- contain binding enforcement mechanisms; and
- to avoid perennial federal-provincial disputes over the transfer amount, be set at a fixed percentage of GDP (a target of 0.5% GDP would restore federal funding to that of the late 1970s).



The Consortium has been calling for the creation of a dedicated federal transfer for post-secondary education since 2000 and it was pleased when the Finance Committee endorsed the concept in its 2004 Report. Momentum for this idea is growing, with provincial governments coming onside. Now is the time for the Government of Canada to take the lead and push forward with this critical step to placing our nation on the road to greater prosperity. The Federal Government has made important investments in university research. Support for the core funding of universities will address critical needs and magnify the impact of the research investments.

### **Recommendation 2 - Increase the Budgets of the Federal Research Granting Agencies**

In addition to funding the core operating costs of post-secondary institutions, the Government of Canada plays another critical role in supporting research in Canada - through its research agencies, the Social Sciences and Humanities Research Council (SSHRC), the Natural Sciences and Engineering Research Council (NSERC) and the Canadian Institutes for Health Research.

Funding for these agencies declined dramatically through the 1990s but has risen in recent years. The research community acknowledges and applauds these increases. Nonetheless, the current level of funding still leaves the agencies unable to meet the growing needs of a new generation of researchers coming into Canadian universities. If Canada is to maintain or increase its ranking as an international leader in research, greater investment is necessary. The Government must:

- as a priority, strengthen social, human and cultural research in Canada by increasing the Social Sciences and Humanities Research Council's funding to \$460 million by 2008-2009 (more than half of all faculty and graduate students work and study in the social sciences and humanities, yet SSHRC's budget is less than half of that of the other agencies - it is past time that this imbalance be corrected);
- increase the budget of the Canadian Institutes for Health Research to \$1 billion by 2008-2009; and,
- increase the budget of the Natural Sciences and Engineering Research Council to \$1.2 billion by 2008-2009.

To ensure greater accountability, efficiency and strategic planning in the expenditure of these funds, the Consortium recommends that the agencies be permitted to carry over unexpended allocations from one fiscal year to the next.

The Consortium recommends that the scientific rigour of research be the determinative factor in resource allocation. The issue of how to facilitate greater private sector involvement in research in Canada, while still ensuring that

scientific excellence is the primary criterion in research funding, is of great concern to the Consortium.

### **Recommendation 3 - Re-invest in Government Research Infrastructure**

Increased support for post-secondary institutions and the research granting agencies is essential, but the government must also re-invest in its own research infrastructure. In addition to a myriad of day-to-day policy choices, Canada also faces major challenges on climate change, energy, pandemic response, drug safety and national security. To deal effectively with this array of issues, it is imperative that the Government have its own reliable, disinterested source of research, knowledge and advice to rely upon. Government departments and agencies, such as Natural Resources Canada, Environment Canada, Fisheries and Oceans Canada, Health Canada, Agriculture and Agri-Food Canada and the National Research Council (NRC) can fill this role.

In addition to being independent, these organizations also engage in extraordinary work. At a time when the Government is experimenting with new mechanisms for facilitating research, it must not forget the successes of traditional models. Canadian Nobel Laureate Gerhard Herzberg's pioneering achievements in molecular spectroscopy at the National Research Council is one example of that organization's outstanding contribution to science. Similar success stories can be found within government departments. The groundbreaking work of Dr. Keith Downey at Agriculture Canada (together with Dr. Burton Craig at the NRC) led to the development of the modern Canola industry, an industry that contributes more than \$6 billion annually to the Canadian economy.

Despite the extraordinary service these departments and agencies have rendered to Canadians, they are all suffering from the lack of necessary financial support. In preparing this brief, the Consortium turned to Statistics Canada for basic quantitative data on Canada's economy, population and education systems. We found an agency struggling to provide information in an atmosphere of chronic understaffing - beset by retirements and without money to replace departing employees. To correct this particular situation, and the broader problem, the Government must direct attention to assessing and supporting the research expenditure needs of its own departments and agencies. The Consortium was pleased with the creation and mandate of the National Science Advisor (NSA) several years ago. This office should be sufficiently funded to properly undertake major projects including a review of the government's research infrastructure and its needs.

### **Part 3 - Conclusion**

Structural factors in the Canadian economy, notably a high level of foreign ownership and a reliance on resource extraction, mean that a large proportion of the research conducted in Canada is performed in the public sector.

Because of this, and the direct relationship between a research-intensive society and a modern, productive economy, the Government of Canada must generously fund Canada's research capabilities. The Canadian Consortium for Research recommends that the Government:

**1 - Increase Funding for the Core Operating Costs of Post-secondary Education Institutions through the Creation of a Dedicated Federal/Provincial Transfer.** To be successful the transfer must:

- be governed by nationally established principles ensuring accessibility, quality and academic integrity;
- contain binding enforcement mechanisms; and
- to avoid perennial federal-provincial disputes over the transfer amount, be set at a fixed percentage of GDP (a target of 0.5% GDP would restore federal funding to that of the late 1970s).

**2 - Increase the budgets of the federal research granting agencies.** Specifically:

- strengthen social, human and cultural research in Canada by increasing the Social Sciences and Humanities Research Council's funding to \$460 million by 2008-2009;
- increase the budget of the Canadian Institutes for Health Research to \$1 billion by 2008-2009; and
- increase the budget of the Natural Sciences and Engineering Research Council to \$1.2 billion by 2008-2009.

**3 - Re-invest in Government Research Infrastructure** including government departments and agencies such as the National Research Council. These institutions have a history of extraordinary achievement. They are ideally suited to provide the government with its own source of research, knowledge and advice, un beholden to special interests or private agendas.

### Canadian Consortium for Research Member Organizations

Canadian Association for Graduate Studies (CAGS)  
Canadian Association of Physicists (CAP)  
Canadian Association of Research Libraries (CARL)  
Canadian Association of University Teachers (CAUT)  
Canadian Astronomical Society (CASCA)  
Canadian Federation for the Humanities and Social Sciences (CFHSS)  
Canadian Federation of Biological Societies (CFBS)  
Canadian Federation of Students (CFS)  
Canadian Mathematical Society (CMS)  
Canadian Meteorological and Oceanographic Society (CMOS)  
Canadian Psychological Association (CPA)  
Canadian Society for Brain, Behaviour and Cognitive Science (CSBBCS)  
Chemical Institute of Canada (CIC)  
Council of Canadian Departments of Psychology (CCDP)  
Statistical Society of Canada (SSC)

## Mémoire présenté au Comité permanent des finances de la chambre des communes

par le Consortium canadien pour la recherche  
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Sous la présidence de l'Institut de chimie du Canada

Septembre 2005

### Section 1 - Introduction

Le Consortium canadien pour la recherche (CCR) est une coalition de 15 organismes nationaux représentant plus de 500 000 personnes à l'avant-garde de la recherche et des études au Canada. Nos membres proviennent des secteurs

public et privé et ils participent à la recherche fondamentale et appliquée, à l'étude et à la pratique des sciences de la nature, des sciences humaines et des lettres. Leur expérience de travail a servi de source d'information aux délibérations du Consortium et a influencé les

recommandations que nous présentons au Comité.

Notre avis est simple. Pour bâtir une économie dynamique et productive – une économie dans laquelle les Canadiens jouiront de la meilleure qualité de vie et du niveau de vie le plus élevé possible – le gouvernement fédéral doit augmenter considérablement ses dépenses visant le soutien :

- des activités principales des établissements postsecondaires par le moyen de paiements de transfert qui y sont spécifiquement destinés;
- des organismes fédéraux subventionnant la recherche;
- de ses propres infrastructures de recherche.

## Section 2 - Recommandations

### **Recommandation 1 – Augmenter le financement du coût de fonctionnement de base des établissements d'enseignement postsecondaire en créant un paiement de transfert fédéral/provincial qui y est spécifiquement destiné**

Les établissements d'enseignement postsecondaire constituent l'assise d'une économie moderne et productive. Ils jouent un rôle central dans la création de nouvelles connaissances et dans la préparation de notre prochaine génération de chercheurs. Pourtant, à tous les points de vue, le soutien du gouvernement, tant fédéral que provincial, aux activités essentielles du secteur postsecondaire est malheureusement inadéquat. Les estimations, basées sur les tableaux de référence financiers du ministère des Finances, indiquent qu'il y a un réel déclin du soutien financier fédéral à l'enseignement postsecondaire de 40 % par personne entre 1992 et 2004. Le soutien provincial a diminué de 8,6 % au cours de cette même période. Il en résulte que le système universitaire et collégial manque cruellement d'argent. L'Ontario, par exemple, s'est classée 59<sup>e</sup> sur les 60 provinces et États d'Amérique du Nord en 2004 en matière de dépense par personne dans l'enseignement postsecondaire, ne devant qu'à la Tennessee. En termes concrets, ce manque de financement mine la qualité de ces établissements ainsi que leur accessibilité en faisant augmenter les frais de scolarités, le rapport professeur/étudiant ainsi que la dépendance envers les facultés offrant des études à temps partiel et en forçant les établissements à faire appel à des groupes d'intérêts pour obtenir des fonds. Les possibilités de s'instruire des étudiants, tant au premier cycle qu'au niveau des études supérieures, en souffrent. Les infrastructures physiques – bibliothèques, laboratoires, bâtiments et terrains – des universités et des collèges sont également menacées. Les évaluations les plus récentes (2001) de l'Association canadienne du personnel administratif universitaire (ACPAU) établissaient les coûts d'entretien reportés du secteur universitaire à 3,6 milliards de dollars.

<b>Consortium canadien pour la recherche Membres du comité de direction</b>
Association canadienne des physiciens et physiciennes (ACPP)
Association canadienne des professeures et professeurs d'université (ACPPU)
Fédération canadienne des sciences humaines et sociales (FCSHS)
Fédération canadienne des sociétés de biologie (FCSB)
Société canadienne de psychologie (SCP)
Institut canadien de chimie (ICC)

Remédier à ce manque de financement contribuera de manière importante à améliorer la productivité économique du Canada ainsi que la vie des générations futures. Les gouvernements provinciaux et fédéral doivent reconnaître leurs responsabilités mutuelles, mettre de côté leurs différends et créer un paiement de transfert fédéral/provincial destiné spécifiquement aux activités principales de l'enseignement postsecondaire. Pour qu'il soit réussi, le paiement de transfert doit :

- être géré par des principes établis à l'échelle nationale qui garantissent l'accessibilité, la qualité et l'intégrité académique;
- comporter des mécanismes d'application contraignants;
- afin d'éviter les éternelles querelles entre les gouvernements fédéral et provinciaux au sujet du montant des transferts, être fixé à un certain pourcentage du PIB (un pourcentage cible de 0,5 % du PIB restaurerait le financement du fédéral à son niveau de la fin des années 1970).

Le Consortium demande la création d'un paiement de transfert fédéral consacré à l'enseignement postsecondaire depuis 2000 et il s'est réjoui de l'appui qu'a donné à ce concept le Comité des finances dans son Rapport de 2004. L'engouement pour cette idée prend de l'ampleur et les gouvernements provinciaux s'y rallient. Il est maintenant temps pour le gouvernement du Canada de prendre la direction du mouvement et de faire un pas important pour positionner notre nation sur le chemin menant à une plus grande prospérité. Le gouvernement fédéral a déjà effectué des investissements importants dans la recherche universitaire. Le soutien au financement de base des universités répondra à leurs besoins critiques et amplifiera l'impact des investissements dans la recherche.

## **Recommandation 2 – Augmenter les budgets des organismes fédéraux subventionnant la recherche**

En plus de financer les coûts de fonctionnement de base des établissements postsecondaires, le gouvernement du Canada joue un autre rôle essentiel en soutenant la recherche au Canada – par le biais de ses organismes de recherche, le Conseil de recherche en sciences humaines (CRSH), le Conseil de recherche en sciences naturelles et en génie (CRSNG) ainsi que les Instituts de recherche en santé du Canada (IRSC).

Le financement de ces organismes a diminué de manière draconienne pendant les années 1990, mais il s'est accru au cours des dernières années. Le milieu de la recherche reconnaît qu'il y a eu augmentation et s'en réjouit. Néanmoins, le niveau actuel de financement ne permet toujours pas aux organismes de répondre aux besoins grandissants de la nouvelle génération de chercheurs arrivant dans les universités canadiennes. Si le Canada désire maintenir ou améliorer son statut de chef de file international en recherche, il faut investir davantage. Le gouvernement doit :

- de manière prioritaire, renforcer la recherche sociale, humaine et culturelle au Canada en augmentant le financement alloué au Conseil de recherche en sciences humaines pour qu'il atteigne 460 millions de dollars d'ici 2008-2009 (plus de la moitié des étudiants de premier cycle et des cycles supérieurs travaillent et étudient dans le domaine des sciences humaines et des lettres. Pourtant, le budget du CRSH représente moins de la moitié de celui des autres organismes. Il est grand temps de corriger ce déséquilibre);
- augmenter le budget des Instituts de recherche en santé du Canada pour qu'il atteigne 1 milliard de dollars d'ici 2008-2009;
- augmenter le budget du Conseil de recherche en sciences naturelles et en génie pour qu'il atteigne 1,2 milliard de dollars d'ici 2008-2009.

Afin d'assurer une meilleure responsabilisation, d'accroître l'efficacité et d'améliorer la planification stratégique concernant la façon dont ces fonds sont dépensés, le Consortium recommande que ces organismes aient le pouvoir de reporter les allocations non distribuées d'un exercice financier à l'autre.

Le Consortium recommande également que la rigueur scientifique de la recherche soit le facteur déterminant dans l'attribution des ressources. La question portant sur la façon de faciliter une plus grande participation du secteur privé dans la recherche au Canada, tout en assurant que l'excellence scientifique demeure le critère principal dans le financement de la recherche, revêt beaucoup d'importance pour le Consortium.

## **Recommandation 3 – Investir de nouveau dans l'infrastructure de recherche du gouvernement**

Augmenter le soutien aux établissements postsecondaires ainsi qu'aux organismes subventionnant la recherche est essentiel, mais le gouvernement doit également investir de nouveau dans ses propres infrastructures de recherche. En plus d'avoir à prendre quotidiennement position sur une multitude de politiques, le Canada doit également faire face à d'importants défis comme le changement climatique, l'énergie, la réaction en cas de pandémie, le caractère sécuritaire des médicaments et la sécurité nationale. Pour pouvoir réagir efficacement à l'ensemble de ces sujets, il est impératif que le gouvernement dispose de ses propres sources de recherche, de connaissances et de conseils sur lesquelles s'appuyer. Certains ministères et organismes gouvernementaux, comme Ressources naturelles du Canada, Environnement Canada, Pêches et océans Canada, Santé Canada, Agriculture et agroalimentaire Canada ainsi que le Conseil national de recherches, peuvent jouer ce rôle.

En plus d'être indépendants, ces organismes effectuent également un travail extraordinaire. Au moment où le gouvernement expérimente de nouveaux mécanismes visant à faciliter la recherche, il ne doit pas oublier le succès des modèles classiques. Les réussites des travaux précurseurs du Canadien Gerhard Herzberg, récipiendaire d'un prix Nobel, dans le domaine de la spectroscopie moléculaire au sein du Conseil national de recherches illustrent la contribution exceptionnelle de cet organisme à la science. Des exemples semblables de réalisations se trouvent dans tous les ministères. Le travail révolutionnaire du Dr Keith Downey à Agriculture Canada (en collaboration avec le Dr Burton Craig du CNR) a été la source de l'essor de l'industrie moderne du Canola, une industrie qui apporte plus de 6 milliards par année à l'économie canadienne.

Malgré les services extraordinaires que ces ministères et organismes ont rendus aux Canadiens, ils souffrent toujours du manque de soutien financier nécessaire. Pour la préparation du présent mémoire, le Consortium s'est tourné vers Statistiques Canada pour obtenir des données quantitatives sur l'économie, la population et le système d'éducation du Canada. Nous avons eu affaire à un organisme luttant pour fournir des renseignements dans une atmosphère de pénurie de personnel chronique – créée par les retraites et le manque d'argent pour remplacer les employés partis. Afin de remédier à cette situation particulière, et au problème général, le gouvernement doit concentrer ses efforts à évaluer et à assumer les coûts des besoins relatifs aux dépenses de recherche de ses propres ministères et organismes. Le Consortium s'est réjoui de la création du poste de Conseiller national des sciences (CNS) et du mandat qui lui a été attribué il y a quelques années. Le poste doit être suffisamment financé pour que son titulaire puisse entreprendre adéquatement des projets majeurs, y compris un examen des infrastructures de recherche du gouvernement et de ses besoins.

<b>Consortium canadien pour la recherche Organismes membres</b>
Association canadienne pour les études supérieures (ACES)
Association canadienne des physiciens et physiciennes (ACPP)
Association des bibliothèques de recherche du Canada (ABRC)
Association canadienne des professeures et professeurs d'université (ACPPU)
Société canadienne d'astronomie (CASCA)
Fédération canadienne des sciences humaines et sociales (FCSHS)
Fédération canadienne des sociétés de biologie (FCSB)
Fédération canadienne des étudiantes et étudiants (FCEE)
Société mathématique du Canada (SMC)
Société canadienne de météorologie et d'océanographie (SCMO)
Société canadienne de psychologie (SCP)
Société canadienne des sciences du cerveau, du comportement et de la cognition (SCSCCC)
Institut canadien de chimie (ICC)
Conseil canadien des départements de psychologie (CCDP)
Société statistique du Canada (SSC)

- être géré par des principes établis à l'échelle nationale qui garantissent l'accessibilité, la qualité et l'intégrité académique;
- comporter des mécanismes d'application contraignants;
- afin d'éviter les éternelles querelles entre les gouvernements fédéral et provinciaux au sujet du montant des transferts, être fixé à un certain pourcentage du PIB (un pourcentage cible de 0,5 % du PIB restaurerait le financement du fédéral à son niveau de la fin des années 1970).

**2 - Augmenter les budgets des organismes fédéraux subventionnant la recherche.** Particulièrement :

- renforcer la recherche sociale, humaine et culturelle au Canada en augmentant le financement alloué au Conseil de recherche en sciences humaines (CRSH) pour qu'il atteigne 460 millions de dollars d'ici 2008-2009;
- augmenter le budget des Instituts de recherche en santé du Canada pour qu'il atteigne 1 milliard de dollars d'ici 2008-2009;
- augmenter le budget du Conseil de recherche en sciences naturelles et en génie pour qu'il atteigne 1,2 milliard de dollars d'ici 2008-2009.

**3 - Investir de nouveau dans l'infrastructure de recherche du gouvernement** y compris dans les ministères et organismes gouvernementaux comme le Conseil national de recherches. Ces institutions ont accompli des exploits extraordinaires. Elles représentent la source idéale de recherche, de connaissances et de conseils pour le gouvernement, car elles ne sont pas liées à des groupes d'intérêts ou à un programme dicté par des intérêts privés.

**Section 3 - Conclusion**

Les facteurs structurels de l'économie canadienne, notamment le niveau élevé de propriété étrangère et la dépendance envers l'exploitation des ressources, signifient qu'une grande proportion de la recherche effectuée au Canada se fait dans le secteur public. Pour cette raison, et à cause de la corrélation directe entre l'intensité de la recherche dans une société et une économie moderne et productive, le gouvernement canadien doit financer généreusement les capacités de recherche du Canada. Le Consortium canadien pour la recherche recommande au gouvernement ce qui suit :

**1 - Augmenter le financement du coût de fonctionnement de base des établissements d'enseignement postsecondaires en créant un paiement de transfert fédéral/provincial qui y est spécifiquement destiné.** Pour qu'il soit réussi, le paiement de transfert doit :

**REMINDER - REMINDER - REMINDER**

CMOS has negotiated great membership deals for its members. CMOS members are eligible for a 25% discount off membership fees for the Royal Meteorological Society (RMetS) and the Canadian Geophysical Union (CGU) as associate members. Members of both these societies are also eligible for associate membership in CMOS; so please encourage your colleagues in those societies to join CMOS too.

**RAPPEL - RAPPEL - RAPPEL**

La SCMO a négocié des tarifs intéressants pour ses membres qui désirent devenir membre de la Société royale de météorologie (RMetS) et de l'Union géophysique canadienne (CGU). Un rabais de 25% est appliqué lorsque vous devenez membre associé de ces deux sociétés savantes. Les membres de ces deux sociétés ont également le privilège de devenir membre associé de la SCMO; dites-le à vos collègues et encouragez-les à rejoindre la SCMO.



# Top 10 Canadian Weather Stories for 2005

by David Phillips<sup>1</sup>

Some people are saying that 2005 was the year Mother Nature was mad at the world. We started the new year in shock from the deadliest tsunami in modern history and ended it still cleaning up from Hurricane Katrina - the costliest storm ever. The year's relentless, unstoppable weather extremes wreaked havoc around the world, including: the driest year in decades across the Amazon rainforest; a record drought in southeastern Australia; weather striking Europe with a biblical vengeance, with eastern sections under water and searing heat and wildfires in the south; weeks of torrential rains and floods in south China, while droughts plagued the north; and in India and Pakistan, deadly heat followed by flooding monsoons. Globally, it was the second warmest year on record over the past 145 years, according to the World Meteorological Organization (WMO). It was also one of the costliest, according to insurers, with record losses from weather-related disasters around the world totalling \$200 billion. Ominously, we also saw a record shrinkage of ice cover on the Arctic sea with possible disappearance in sight.

Throughout the year, generous Canadians freely donated money and help to the victims of nature's misery around the world. At the same time, we were in awe of the power and force of nature and quietly thankful that we live in Canada - not immune to nature's wrath but seemingly out of its sight. Complaints about snow, frostbite, heat and humidity, potholes, slush and brownouts seemed to pale in comparison to the deadly weather outside our borders. But as we head into 2006, many shudder at the thought of what another year could bring. Scientists can't yet say that the increased weather severity can be directly linked to a warmer world, although it is certainly consistent with our expectations of climate change. But with or without global warming, weather extremes are becoming increasingly catastrophic for modern societies because our larger communities create more targets for Mother Nature's wrath. Our buildings are taller, more ground surface is paved over and we have more people living in close proximity. It's no wonder we are becoming more vulnerable to severe weather incidents.

Hopefully, 2005 was a blip - a year of unlucky extremes and disasters, and not the beginning of an irreversible global trend to weather weirdness and meteorological mayhem.

While Canadians were spared for the most part in 2005, we still had our share of weather extremes. It was another warm year in Canada and the wettest ever, with rain, rain and more rain dominating the weather news from coast to coast. Insured property losses and other costs also made

it our most expensive summer ever. Thankfully, deadly tornadoes, devastating hurricanes, drought and plagues were a "no show" for this year and it is hoped that their absence will be repeated in 2006.

Dominating this year's top weather stories in Canada were floods in three different provinces. Once again, Alberta owned the year's number one weather story with record June rains and ensuing floods that became the province's costliest disaster ever. Those same summer storms rolled into Manitoba and triggered the worst summer flooding in that province's history. Both events led to enormous property losses over \$750 million. In Ontario, a family of August afternoon storms generated a deluge in Canada's largest city that in less than two hours became the most expensive weather disaster from an insurance perspective in the province's history and the second largest insured loss event in Canadian history.

Other top weather stories for 2005 included: a record warm summer in Ontario and Québec that was both the sweatiest and smoggiest ever; heavy May rainfalls in Nova Scotia and New Brunswick that led to extreme flooding; too much snow in one week in the Maritimes, but too little on the West Coast to suit winter sports fans; the arrival of a Tropical Punch on the Pacific Coast leading to landslides; and wild November gales around the Great Lakes that included a rare tornado. And though 2005 was all about major hurricanes in North America, Canada didn't see one.

## Top Ten Weather Stories for 2005

1	Alberta's Flood of Floods
2	Manitoba's Worst Widespread Flooding Ever
3	Ontario's Most Expensive Weather Disaster
4	From a Bummer to a Hummer of a Summer
5	Year of the Hurricane ... But not in Canada
6	April Showers Bring May Floods to the Maritimes
7	Winter Snow Goes Missing in British Columbia
8	Atlantic Canada's Week of Snow
9	November's Nasty Weather Brew
10	BC's Tropical Punch

The following "Top Ten Canadian Weather Stories for 2005" (Table listed above) are rated from one to ten based on factors that include the degree to which Canada and

<sup>1</sup> Senior Climatologist, Meteorological Service of Canada, Downsview, Ontario, Canada

Canadians were impacted, the extent of the area affected, economic effects and longevity as a top news story.

### **#1 Alberta's Flood of Floods**

Though spring was dry across southern Alberta - some 50% drier than normal - farmers and ranchers were not overly concerned. Fall and winter together had been wetter than normal, and June is often the wettest month of the year. For 2005 it couldn't have been more true! June was so wet that by the end, several communities had gone through their wettest month ever.

Three major storms about a week apart drenched the region, generating record high water levels. Rivaling historic floods, rain-swollen streams burst their banks, inundating southern Alberta towns and forcing thousands of residents to evacuate. At High River, rising waters forced residents out of their homes on at least two occasions, some being airlifted by helicopter. Floodwaters washed out roads and parks, destroyed sewers, bridges and other infrastructure, wrecked buildings and drowned livestock. In Calgary, one in ten dwellings reported damage. Insurance losses were staggering and, together with uninsured infrastructure, could easily top \$400 million, including \$275 million in insured losses -- making it one of the costliest natural disasters in Alberta's history.

About 40 municipalities identified infrastructure damage and fourteen declared official states of emergency. Four people lost their lives - two when they were swept away by turbulent waters and two others when vehicles plunged into swollen rivers.

While the moist weather systems were not unusual, they stalled and even tracked westward instead of following their usual west-to-east movement. What became a real blessing was the previous winter's lack of snowfall in the southwest foothills (the lowest in four decades), which left little melt water to add to the pouring rain. Still, many rivers such as the Bow, Oldman and Red Deer were engorged, flowing 10 to 30 times their usual volume. Hydrologists estimated the flooding as a 1-in-200-year occurrence. Fortunately, dams and other hydrologic structures helped to limit some of the damage. Without them, Drumheller would have looked like New Orleans after Katrina.

In Calgary, June was the wettest month ever recorded. Total rainfall was 247.6 mm compared to a normal of 79.8 mm. Outside the city, monthly rainfalls approached 400 mm. When the Glenmore Reservoir overflowed for the first time in memory, the normally placid Elbow River peaked about ten times its usual June flow, prompting unprecedented evacuation plans for numerous riverside communities. More than 2,000 Calgary residents, from millionaires to boarders, abandoned their residences. Floodwaters filled basements to the ceiling with foul-smelling, raw sewage. Concern was also raised over Calgary's supply of clean water. By the opening of the Calgary Stampede, Southern Albertans had seen enough rain to last a lifetime.

### **#2 Manitoba's Worst Widespread Flooding Ever**

Manitoba knows flooding. Almost every spring there is concern about the flood threat from winter's melting snowpack and heavy April showers. In 2005, the province experienced its most widespread flooding on record. But what was truly remarkable was a rare summer flood as a result of torrential rains that fell repeatedly through June and July. It was a matter of too much rain too fast and over too many days. Summer thunderstorms were widespread, intense and frequent, arriving in bands 20 minutes apart that often tracked across the same ground. Flooding extended from boundary to border as one downpour after another filled Manitoba's small and mighty rivers and lakes. Waterways recorded their highest summer flows on record. In the north, the huge Churchill River hit its all-time high river level. In the south, the Red River in downtown Winnipeg rose to 6.1 m on July 3 - the second highest river level recorded in the city since major flood control works began in 1969. Nearly 200 local authorities requested disaster assistance and 22 municipalities declared a state of emergency. Over 5,000 private flood damage claims were filed, not including agricultural losses, and totalled more than \$50 million. The number of claims was the second highest on record, topped only by those from the flood of 1997.

Manitoba had never before seen so much accumulated rainwater. Standing water extended over the largest geographic area on record. Manitoba's version of the monsoon season came from a series of intense low-pressure systems often arriving from south of the border. The most severe storm came on June 1 when intense thunderstorms and accompanying tornadoes raked the western half of the province near Melita and Brandon and northeastward towards Riding Mountain National Park. Officially, between 90 and 130 mm of rain fell but there was also a report from an unofficial gauge of an unbelievable total of 230 mm over June 1-2. The rains did not let up and by July 15, several locations saw totals up to four times their usual fall over the first six weeks of summer.

While the deluge created headaches for city residents, it was more devastating for rural folk. Parts of paved highways were under water for days on end. There were more road closures at one time than the province had ever seen - even in winter! Pasture land resembled rice paddies and crop lands featured whitecaps. Some of the best farmland in Canada was too soggy to farm. Manitoba Agriculture estimated that one million square kilometres were lost to the waters - more than one quarter of the province's farmland. Old timers couldn't remember so many fields going unseeded. Even worse, 2005 was the fourth year of the last seven that Manitoba farmers have not been able to seed a full crop. Projected losses approached \$350 million, with a further adverse rippling effect on the provincial economy of \$1.8 billion.

### **#3 Ontario's Most Expensive Weather Disaster**

On the afternoon of August 19, a line of severe thunderstorms tracked eastward across southern Ontario from Kitchener to Oshawa, including the northern half of Toronto. In its wake, the storm left a trail of damage that, according to the Insurance Bureau of Canada, represented the highest insured loss in the province's history, exceeding \$500 million. That's more than two and a half times Ontario's losses during the infamous ice storm of 1998 and the second largest loss event in Canadian history.

Literally dozens of thunderstorms were popping up at any one time. At its worst, the system spawned two F2 tornadoes with gusts between 180 and 250 km/h. The first tornado tracked through Milverton to Conestogo Lake (west of Elmira). The second moved from Salem to Lake Bellwood (north of Guelph). The twisters uprooted hundreds of trees, chewed the limbs off countless others, downed power lines, tossed cars and trucks aside, and ripped into several homes, cottages and barns. To illustrate the storm's incredible force, at one farm, the twisting winds drove a ballpoint pen seven centimetres deep into a tree, splitting the trunk.

Although a rare tornado warning was issued for Toronto, the storm packed a different wallop as it approached from the northwest. The storm featured torrential rains, quarter-to-golf-ball size hail, strong straight-line winds and flash flooding. During the height of the tempest, wind gusts peaked at 72 km/h and there were 1,400 lightning strikes per minute. However, it was the flash flooding that caused the greatest destruction. The storm dumped 103 mm of rain in one hour across a swath of North York and surrounding area. That compares to 53 mm in one hour from Hurricane Hazel in 1954. At Environment Canada's Downsview offices, 130 mm of rain fell - 100 mm in less than an hour - an unprecedented amount for any storm in Toronto, and easily greater than the one-in-one-hundred years storm. The deluge flooded two floors of the Downsview building, prompting employees to huddle in the basement and interior auditorium in order to ride out the storm. A block or two to the north in Thornhill, a weather watcher emptied her rain gauge at 175 mm. Around the city, torrential rains snarled traffic and stranded drivers. Fire services responded to more than 1,000 calls. In one dramatic scene, marine services personnel rescued four people who fell into the fast-moving currents of the Don River.

An early tally found that there were over 15,000 insurance claims submitted for sewer backups caused by torrential rains and for structural wind damage. Not included in the insured losses were enormous infrastructure damages across the city. For example, about 30 m of Finch Avenue West was washed out. Repairs had still not been completed by the end of the year.

### **#4 From a Bummer to a Hummer of a Summer**

At times during the summer, residents across Ontario and southern Quebec either enjoyed or endured bouts of torrid

heat and insufferable humidity. Combined with a record number of smog days, it was easily one of the hottest, sweatiest and dirtiest summers ever. And what a contrast to 2004 when summer went missing - it was either too cool, too wet or too cloudy for the likes of most people. If 2004 was the year without summer, 2005 was the year summer wouldn't end.

The summer of summers began with the warmest June ever, and the record-breaking trend continued into July, August and beyond. For traditional hot spots such as Windsor and Toronto, June-to-August was the warmest on record. Of significance was the number of hot days (>30 °C) in Toronto. Normally, the city gets approximately 14 hot days a year. In 2004 there were only 3 hot days, but in 2005 there were a whopping 41! Montreal was also well above its average of 8 hot days per year, logging in with 23 for 2005. In contrast, there were only 2 hot days in 2004. Back in Toronto, the city issued eight heat alerts and 18 extreme heat alerts for a total of 26 heat days. The previous record was 19 in 1991. If anything, the summer heat was uncommonly relentless with few breaks between each episode.

For many it was the oppressively high humidity that evoked most of the complaining and for good reason. At Toronto, the number of days with humidex values greater than an uncomfortable 35 reached 44, tying the record in 1955 and 2002. The summer also featured the longest-ever bout of jungle-like humidity lasting 13 consecutive days beginning on July 10. But while daytime sweats can be eased by swimming pools and workplace air conditioning, it was the high night-time minimum temperatures that often led to much tossing and turning. In Toronto, minimum temperatures were a sweltering four degrees warmer than normal. Further, there were 25 nights in which the minimum temperature did not drop below 20 °C (i.e. tropical nights), breaking the previous record of 19 in 2002.

With excessive heat, loads of sunshine and sluggish air circulation, frequent smog days were inevitable. At times, the heavy air was almost unbreathable and the smog was so thick that the CN Tower was only partially visible from a distance. The Ontario Ministry of Environment issued a record-breaking number of smog advisories from May 1 to September 30, covering 42 days across the province. Advisories ranged from 38 in Toronto to 10 in Sault Ste. Marie. June had exceptionally bad air, with smog advisories covering 20 days (two-thirds of the month). One episode lasted an unprecedented eight days. In Québec, there were five actual smog episodes (not advisories) from May to September, counting 13 days in total, ranging from 12 days in Montréal to 4 days in the Laurentides and Québec-Beauce. The longest bad air episode lasted six days from June 8-13 across Montréal and in the region of Drummondville / Bois-Francs.

At least six deaths in Toronto were blamed on the relentlessly hot summer, and that's likely just a fraction of the real mortality rate due to heat and smog. It was no

surprise that power consumption was at an all-time high. Ontario's electricity manager issued more than a dozen emergency appeals to reduce power consumption in order to avoid rotating blackouts. With megawatts of power flowing at record levels, the province had to dim voltage by 5%.

Yet, the majority of residents seemed ecstatic over a summer that just went on and on. By Labour Day, summer came in as the warmest on record. But it didn't stop. The 6-month period from June to November turned out to be the warmest on record across parts of Ontario and Québec. All people were talking about was the long stretch of bonus warmth, especially in the fall. It was so pleasantly warm for so long that many residents either felt guilty or concerned that somehow they were soon going to pay for the excess of delightful weather.

### **#5 Year of the Hurricane...But Not in Canada**

Forecasters predicted another active Atlantic hurricane season, but hyperactive was more like it! The final tally was 26 tropical storms and 14 hurricanes - both new all-time records - with two years' worth of storms in one. The busy storm season reflected a continuation of above-normal activity that began in 1995. Since then, all but two Atlantic hurricane seasons (1997 and 2002) have been stormier than normal. In 2005, more than half the storms ventured into the western Caribbean or Gulf of Mexico where sea surface temperatures were at their second warmest since 1982 when satellites were first used to observe water temperatures.

Among the hurricane highlights in 2005:

- 26 tropical storms from Arlene to Wilma and from Alpha to Epsilon. The previous busiest storm season on record was in 1933 with 21 storms.
- 14 Atlantic hurricanes eclipsed the previous record of 12 in 1969.
- A record of three Category 5 hurricanes - Katrina, Rita and Wilma - with sustained wind speeds in excess of 250 km/h.
- Hurricane Wilma was the most intense hurricane ever recorded in the Atlantic Ocean, with a central air pressure falling to 882 mb. Its \$10 billion price tag made it the third costliest storm on record.
- Dennis, Katrina, Rita and Wilma claimed 1,500 lives among them, with Katrina being one of the deadliest in USA history.
- Costs from Katrina totalled \$125 billion (CDN), of which \$40 billion was insured, making it by far the costliest weather disaster in world history.

Among factors contributing to the active hurricane season were: a continuation of super-heated ocean waters across the tropical Atlantic; higher ocean heat content; favourable winds and an upper air circulation that encouraged easterly winds; stagnant atmospheric circulation favouring an earlier start; strong winds off North Africa pushing more storms across the Atlantic Ocean; and an absence of shearing trade winds that would rip apart developing storms.

Unlike 2004 - when the season began slowly, grew to record activity and died as quickly as it began - 2005 began quickly and stayed active right to the end and beyond. While a record number of tropical storms swirled their way through the North Atlantic, surprisingly, few of them headed northward into Canada and none had nearly the impact of those in the United States and the Caribbean.

At the end of August, the remnants of Katrina tracked parallel to the axis of the Lower Great Lakes and the St. Lawrence River drenching a narrow swath of southern Ontario from Long Point to near Hamilton with 100 mm of rain. In Québec, the remains of Katrina brought between 80 and 100 mm of rain to the Basse-Côte-Nord region. Flooding was reported from overflowing rivers and washed out culverts in Charlesbourg and Vanier. On August 31, several daily rainfall records were set, including 73.8 mm at Montréal's P.E. Trudeau Airport - its wettest single day in August - and 73.9 mm at Québec City, which became its new record for the wettest August day.

On September 17, the remains of Tropical Storm Ophelia brought foul weather to parts of the Nova Scotian mainland, before racing to Newfoundland the next day. Winds gusted up to 96 km/h and rainfall amounts ranged between 70 and 100 mm in thunderstorms. Waves as high as 11 m were reported at a buoy off Nova Scotia. Later, on September 26, the remains of Hurricane Rita merged with a low pressure system that crossed Québec. Record-breaking rainfalls fell north of Montréal and in Québec City. The greatest one-day rainfall was at Deschambault with 124.4 mm. On October 26, Hurricane Wilma's remnant low passed south of Sable Island, Nova Scotia where it was absorbed by a massive system off the continent. The hybrid storm generated moderate rainfall amounts of 30 to 50 mm. Generally, the nastiest weather occurred out at sea (e.g. waves built to nine metres.) High winds gusted to 125 km/h in communities on Cape Breton Island and the storm caused flooding problems around Sydney. Rough seas occurred along the Atlantic coasts of Nova Scotia and into the Gulf of St. Lawrence but there was little coastal flooding. The storm moved too fast to build the seas over a long fetch.

### **#6 April Showers Bring May Floods to the Maritimes**

Several Nova Scotia communities experienced their driest summer on record in 2005. But before the dryness, they had to endure their wettest spring ever. At Halifax, spring rainfall from March to May inclusive totalled a record 589.4 mm - some 225 mm greater than normal. Of the total, more than half fell in May, drowning the previous record of 230.1 mm set in 1971. Other all-time May records this year included Cape Sable Island at 418.4 mm and Liverpool at 508.4 mm.

The mammoth rains came from a parade of storms moving up the East Coast and stalling over the Maritimes from a blocking ridge of high pressure over Labrador. The system that hung around from May 21 to 27 generated strong winds and most of the rain that led to major flooding across

the Maritimes. The heavy rainfall on the long weekend in May caused many rivers and lakes along the south shore of Nova Scotia to flood, prompting officials in Lunenburg to declare a local state of emergency. Rising waters swamped homes, closed bridges and washed away several roads, leading to numerous evacuations. The wet May had an adverse effect on farming, delaying crop planting by two to three weeks. It is hard to imagine a more dreadful month of weather. Even when it wasn't raining, it was cold, grey, overcast and blustery. At Halifax, temperatures were 1.4 °C cooler than normal, and only once in May did the day's high rise above 18 °C. Total sunshine at Shearwater amounted to only 63% of normal for the month - some 70 hours short of normal. Even more revealing, over half the days had less than one hour of sunshine including nine days in a row.

Flooding was worse in the upper reaches of the St. John River in New Brunswick. The headwaters of the basin received heavy snowfall throughout the winter and record precipitation in March and April. Saint Léonard lost 151 cm of snow on the ground in five weeks. When the large accumulation of snow and ice started melting quickly, followed by heavy spring rains and some very warm temperatures the second week of May, the spring freshet came fast and was intense. Water filled the Saint John River to the brim. Then came the copious rains on the May long weekend with 80 mm at St. Léonard. Flooding forced more than 40 families from their homes and washed out major sections of New Brunswick's main highways and several city roads. At Fredericton, the river rose a metre above flood stage pushing water into streets and homes. While flooding was much higher than normal, it was still a half metre lower than the highest levels reached in 1973's one-in-200 year flood.

#### **#7 Winter Snow Goes Missing in British Columbia**

The winter forecast for the West Coast was warmer and drier than normal. No-one, however, foresaw the scanty snowfall and thin snowpack that accumulated over British Columbia's winter resorts. Never in recent years had snow conditions been so pathetic, leading to huge economic write-offs and major disappointment among snow enthusiasts. For such fans, worse weather could not have occurred: record January rainfall, record February sunshine and record warm March temperatures. And adding to the frustration, near-record snow fell in April just when most resorts had given up and closed for the season.

A strong and persistent ridge of high pressure over British Columbia effectively blocked winter storms from entering the southern two-thirds of the province. When moist air did roll in, it often occurred with bouts of warmth or torrential and unrelenting rains. Whistler-Blackcomb had its lowest snowfall accumulation since the resort opened in 1966, between a third and a half of its average seasonal accumulation. Worse, soaking rains, abundant sunshine and balmy temperatures eroded what snow did fall. At Mount Washington, on Vancouver Island, the mountain resort typically receives an annual average of 9 m of snow.

This winter, the slopes were uncommonly grassy and bare. At the peak of the ski season, the snowpack measured a paltry 12% of normal. Ironically, in April, the resort received a whopping 360 cm of snow - the biggest April snow dump in 25 years, making for the best end-of-season skiing in memory. In the BC Interior, conditions were also snow poor. In February, Kelowna was drier than Los Angeles and warm too, with every day above freezing and no snow - weather conditions never seen before. In Kamloops, cross-country skiers said snow conditions were the worst in 44 years. The major resort corporation, Intrawest, said this snow season had the most challenging weather for skiing in 40 years. At its main property at Whistler, visits were off by 14%, costing the company millions in lost revenue. With more mud than powder, skiers and snowboarders abandoned BC slopes for the higher altitudes of Alberta.

Despite the absence of winter across British Columbia, conditions were ripe for avalanches. In late March, the BC Avalanche Centre warned backcountry skiers, snowboarders, snowshoers and snowmobilers to use particular caution after a fresh dump of snow (40 cm) and mild spring temperatures. Further, several rapid freeze/thaw cycles and high winds combined to create an unstable snow pack. On average, 15 people die as a result of being caught in an avalanche every year in Canada. In 2004-5, there were six deaths.

#### **#8 Atlantic Canada's Week of Snow**

By mid-January, Atlantic Canada was averaging one good dump of snow a month since November - enough to keep roads bare and residents fit. Then, on January 17, up to 40 cm of snow, accompanied by winds gusting to 90 km/h, raked the region. Drifting snow caused more problems than accumulation. Blowing snow and white-outs created some very treacherous driving and walking conditions.

Before residents could fully recover, Atlantic Canada braced for another winter blow three days later. Many felt relieved when they got roughly half the snow dumped from the earlier storm and less wind. But, the worse was yet to come! On January 23-24, a slow-moving storm had time to drop record amounts of snow across the Maritimes. Blizzard conditions occurred everywhere, with huge snowfalls and hurricane-force winds gusting to 130 km/h. Adding to the misery were very low temperatures, creating brutal wind chills of -35, unusually cold for the Maritimes. In many elevated places, snowfall totals exceeded 50 to 70 cm. Several weather stations broke their record for the snowiest January day. The mammoth storm buried Greenwood with 64 cm of new snow, nearly doubling its single-day January record of 35 cm set in 1962. Yarmouth's 59 cm was another single-day January record, tipping the previous high mark of 47 cm in 1943. You know it's a lot of snow when they close the ski hills. The storm also forced major highway closures, along with the airport and all schools, for at least two days. Churches cancelled services and stores closed after being opened for a couple of hours.



It was a dangerous storm for anyone being outdoors. The heaviest precipitation bands had snow rates of 7 to 9 cm per hour with total storm duration lasting between 24 and 30 hours. Significant drifting of 1 to 2 m occurred almost everywhere, particularly in the lee of buildings and downwind of open fields. In many cases, cars were mostly or completely buried. Several motorists had to be rescued after becoming stranded on the Trans-Canada Highway. Of surprise to Nova Scotia residents, the storm did not create any power interruptions.

The big talk was three major blizzards in one week. Weekly snowfall totals during the third week of January amounted to: 139 cm at Greenwood, 111 cm at Yarmouth, 93 cm at Sydney, 90 cm at Charlottetown and 76 cm at Moncton. The accumulated effect of the storms cost businesses millions of dollars. At one Halifax shopping centre, bad weather had closed the mall for an unprecedented three and a half days since December 27.

### **#9 November's Nasty Weather Brew**

November is one of the windiest months on the Great Lakes. Gales of November have accounted for nearly half of the ship wrecks in those waters. The location of the lakes in the interior of North America, between the source regions for contrasting arctic and tropical air masses, often brings the region rapidly changing and explosive weather systems. In November, along the overriding jet stream, developing cyclones track eastward into the Great Lakes where they often get an extra shot of energy from the relatively warm lake waters. Lows are often stronger than at other times of the year. These nasty storms are called "witches of November".

In the first week of November 2005, a vicious "witches" storm pummelled the lower Great Lakes region packing wind gusts of 90 km/h. South of the Great Lakes, the storm spawned a deadly tornado in Indiana that killed 22 people. In Ontario, damage was - for the most part - minor and localized. In Hamilton, the storm tore down trees, ripped hydro lines, blew around recycling boxes and debris, and downed traffic lights. Emergency crews were kept hopping as they responded to hundreds of calls. The strongest winds were generally reported over higher ground and in exposed areas to the lee of the Great Lakes. Hydro One reported up to 70,000 customers without power across the province.

On November 9, another line of storms moved through the province. The day proved to be one of the wackiest weather days ever in Ontario. Temperatures climbed to a balmy 20 °C in Windsor, Ottawa experienced a bout of freezing rain, Barrie had snow and Hamilton saw a rare tornado. The Hamilton twister struck about 4 p.m. and lasted 10 minutes. As an F-1 category tornado, it packed winds up to 180 km/h, giving it the strength to pick up and toss around dumpsters, cause walls to buckle, roofs to peel back and cars to flip over. The tornado carved a narrow 7-km path through the city, causing extensive damage to some homes but sparing their next door neighbours. The

twister damaged a school and lifted the gym's roof off its foundation. At least a dozen homes were so badly damaged that residents couldn't move back in. Miraculously, only two children suffered minor injuries. The twister was only the third to touch down in Canada later than November 9 since record-keeping began in the early 1900s. The other two Ontario tornadoes touched down in the southwestern communities of Leamington (November 29, 1919) and Exeter (December 12, 1946).

A third major "witches" brew struck southern and central Ontario on November 16 and 17. Wind gusts reached as high as 100 km/h. Hydro One reported that fierce winds knocked out power to more than 50,000 customers across the province. Power restoration was difficult because in some instances sustained winds felled power lines two or more times. Roads in Toronto were flooded and houses in one neighbourhood were evacuated when a retaining wall weakened. South of the Great Lakes in the United States, the weather again caused more serious damage, triggering 35 tomadoes. In Hamilton, the sound of the wind only reminded some residents of the tornado just a week before.

### **#10 BC's Tropical Punch**

In mid-January, following a two-week blast of wintry weather across BC's Lower Mainland and Vancouver Island, a persistent flow of record warm, moist air dubbed the "Tropical Punch" engulfed southwestern British Columbia. But more than the usual "Pineapple Express", this system originated south of Hawaii, drawing northward even wetter and warmer air from the subtropics. Temperatures soared to record levels. Abbotsford reached a balmy 18.1 °C on the 19<sup>th</sup>, the highest January temperature recorded anywhere in the province since 1899. Victoria also shattered its warmest-ever January reading at 16.1 °C. The system soaked the BC coast with record rain. At Tofino, on Vancouver Island, 96.8 mm of rain fell on January 17 and a phenomenal 197.2 mm the next day - both new daily records. Port Renfrew received a two-day total of 342 mm. Compounding the problem, the ground was still frozen and could not absorb the runoff as denuded slopes couldn't hold back the rushing waters.

Crews worked feverishly to free storm drains of debris and ice. Automobiles hydroplaned off streets and roads into flooded ditches; dykes ruptured; sump pumps broke down under heavy usage; and parking lots became mini-lakes. The week-long rains washed out bridges and highways and forced hundreds to flee mud-filled homes. Damages were in the tens of millions of dollars. In North Vancouver, a massive slide of mud, trees and rocks rushed down a 75-metre-high embankment, completely destroying one home and dam, killing a woman and forcing the evacuation of the neighbourhood.

**Source: Meteorological Service of Canada - Environment Canada - Government of Canada, The Green Lane™ Website, 29 December 2005.**

# A Centennial Celebration of Saskatchewan Severe Thunderstorms

by Alexander H. Paul<sup>1</sup>

**Résumé:** La province canadienne de la Saskatchewan a célébré son centenaire en 2005. Pour souligner cet événement, l'auteur prépare un livre sur les orages spectaculaires en Saskatchewan. Au cours de la période de 1905 à 2005, on passera en revue les événements comme les tornades, les bourrasques de vent froid, les tempêtes de grêle, les crues soudaines et les éclairs. Les renseignements obtenus proviennent d'une variété de sources telle que: les observations météorologiques; les archives historiques et celles provenant des journaux locaux; les registres de l'assurance grêle des récoltes; et les résultats obtenus d'un petit nombre de projets de recherche spécifiques. En moyenne, à l'été, on dénombre environ 20 à 30 jours où des grosses tempêtes occasionnent des dégâts. Dans ce cours article, on ne fait appel qu'à des renseignements limités. Pour illustrer les impacts et les caractéristiques, j'ai choisi une journée de tempête importante pour chaque décennie. En fonction de l'analyse, les implications de quelques résultats sont discutées et deux questions importantes sont posées et obtiennent partiellement une réponse: 1) parmi ces phénomènes de tempêtes et au cours de ces saisons d'été, est-ce qu'il y a des preuves pour des tendances temporelles? et, 2) comment devons-nous faire pour continuer d'améliorer la prévision de leur fréquence et réduire leurs impacts négatifs?

## Introduction

The Canadian province of Saskatchewan celebrated its centenary in 2005. In recognition the writer is preparing a book on the province's spectacular thunderstorms. Tornadoes, plough winds, hailstorms, flash floods and lightning events from 1905 to 2005 will be reviewed. Information is drawn from a variety of sources including official weather observations, archival sources such as local newspapers and histories, records of crop-hail insurance, and results of a small number of specific research projects. On average, about twenty to thirty days a summer produce major storm damages. In this brief paper only a limited amount of such material can be presented. I have selected one significant storm day from each decade to illustrate impacts and characteristics. In terms of analysis, the implications of some of the results are discussed, and two important questions are posed and partially answered:

- 1) is there evidence for any temporal trends in these storm events and seasons?
- 2) how do we continue to improve forecasting their occurrence and reducing their negative impacts?

## Ten Major Storm Days

### 1. 30 June 1912 – the Regina Tornado

The death toll from this event still ranks as the largest from any Canadian tornado. Most sources (Anderson 1968, McKay and Lowe 1960, for example) say 28 died; a few report 30 (Paul 1995, Looker 2000). Either way, the number exceeds the 27 fatalities from the Edmonton, Alberta tornado of 31 July 1987. The Regina "cyclone" came from the southsouthwest at 4.50 p.m. in the afternoon of a hot, humid day. Its track was about 150 metres wide, right

through the centre of the young city. As the parent thunderstorm passed, a downpour of rain estimated at 1 inch drenched the urban area. Although there are sketches of the funnel drawn from memory, curiously there is no known photograph of it. It was the Sunday afternoon of a holiday weekend and many people were out and about. Clearly cameras were not yet a part of everyday technology.

### 2. 3 July 2000 – the Vanguard Flood

Intense thunderstorm rainfalls may be sustained for several hours when the storms are slow-moving, or may be repeated if a second storm affects the same locality. Thus accumulations of 100-200 mm in a single day are by no means unknown. In recent years the most dramatic case in Saskatchewan was the disastrous flash flood at Vanguard on 3 July 2000, when 330 mm (13 inches) of thunderstorm rain fell in 10 hours from late afternoon until the early hours of 4 July. The small town and surrounding area metamorphosed into a lake that had still not fully receded one year later. Homes, businesses, farm yards and land, roads, the railway and other infrastructure were all devastated. Total losses likely exceeded \$10 million.

Several other convective rainfalls of roughly this magnitude are known from the province. Railway and road washouts from 150-200 mm falls are experienced somewhere in Saskatchewan almost every year. On 25 June 1975 most streets and many basements in the city of Regina were flooded by 150 mm of rain over several hours. More commonplace was the thunderstorm flooding in the towns of Kipling and Whitewood on 27 June 2001. Damage to homes surpassed \$1 million in each place, and short-duration rains of almost 75 mm were the culprits.

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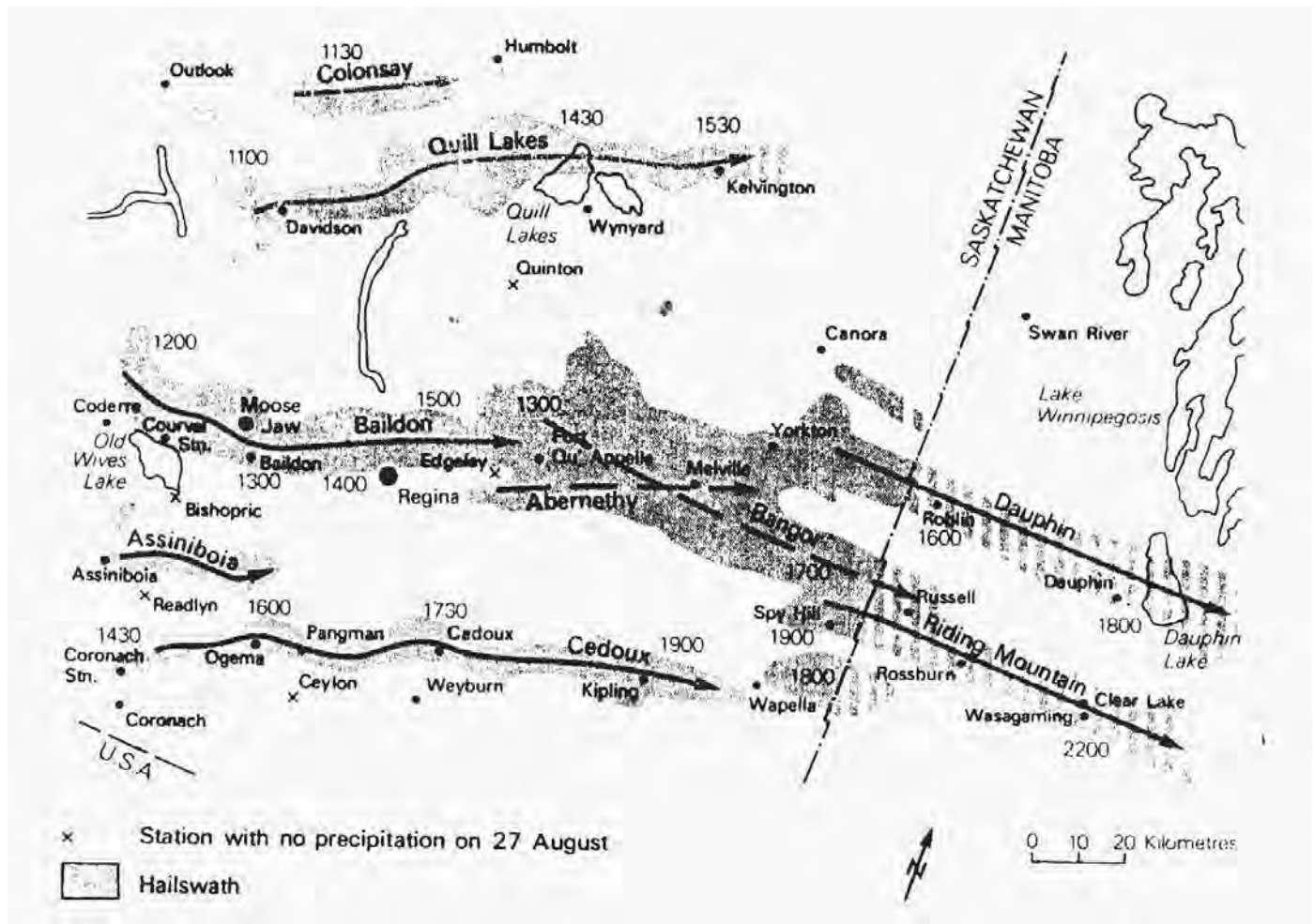


Figure 1: Hailstorms of 27 August 1973

3. 1 July 1935 – Hail and Plough Winds

The 1930s are best known for their droughts but on this occasion an episode of the opposite kind afflicted the Weyburn-Carlyle-Estevan area of southeastern Saskatchewan between 2 and 6 p.m. A killer tornado struck a farmstead near Benson about 5 p.m. and plough winds and baseball-sized hail had raced through the Carlyle area about an hour earlier. The Carlyle rink was blown apart and torrential rains rendered roads north of the town impassable for days. Earlier in the afternoon the Radville, Weyburn and Lang districts had all received heavy hail with many windows, roofs and automobiles damaged. Most of the glass at Weyburn Greenhouses was smashed. Wind and lightning damages were widespread. Further to the north at the same time several inches of rain fell in the Duval-Strasbourg area and chickens and turkeys were killed by large hailstones. Flash flooding also occurred in the extreme southeast of Saskatchewan around Carnduff and Carievale. Events on this date were very typical of the severe thunderstorm outbreaks which are experienced frequently at the height of the summer season.

4. 14 July 1953 – the Golden Ridge Storm

This storm is used here to illustrate the difficulty of investigating events in the “north woods” regions. On this date at about 7.30 p.m. (or perhaps 8.30 p.m. – the sources differ) the remote crossroads hamlet of Golden Ridge was hit by either a plough wind or a tornado. The new Catholic church was demolished, the general store lost its roof and two houses lost their upper storeys. Only a few farms surrounded by bushland and forest existed in this district northwest of Meadow Lake and so it is impossible to assess how extensive the storm area was. Large hail, damaging winds, and battered crops and gardens, though, were described as widespread. On one farm all the buildings including the house were destroyed, and a teenage girl was pinned against a barbed-wire fence by the wind. A man driving a car picked up by the wind and then rolled 200 yards across a field had to be airlifted a second time, to hospital in Saskatoon. He, too, survived. These few snippets of information in local newspapers comprise most of the information readily available on this storm at 54.4 degrees North latitude, halfway from the U.S. border to the Northwest Territories. They certainly remind us that such storms do occur over the whole province and not just in the

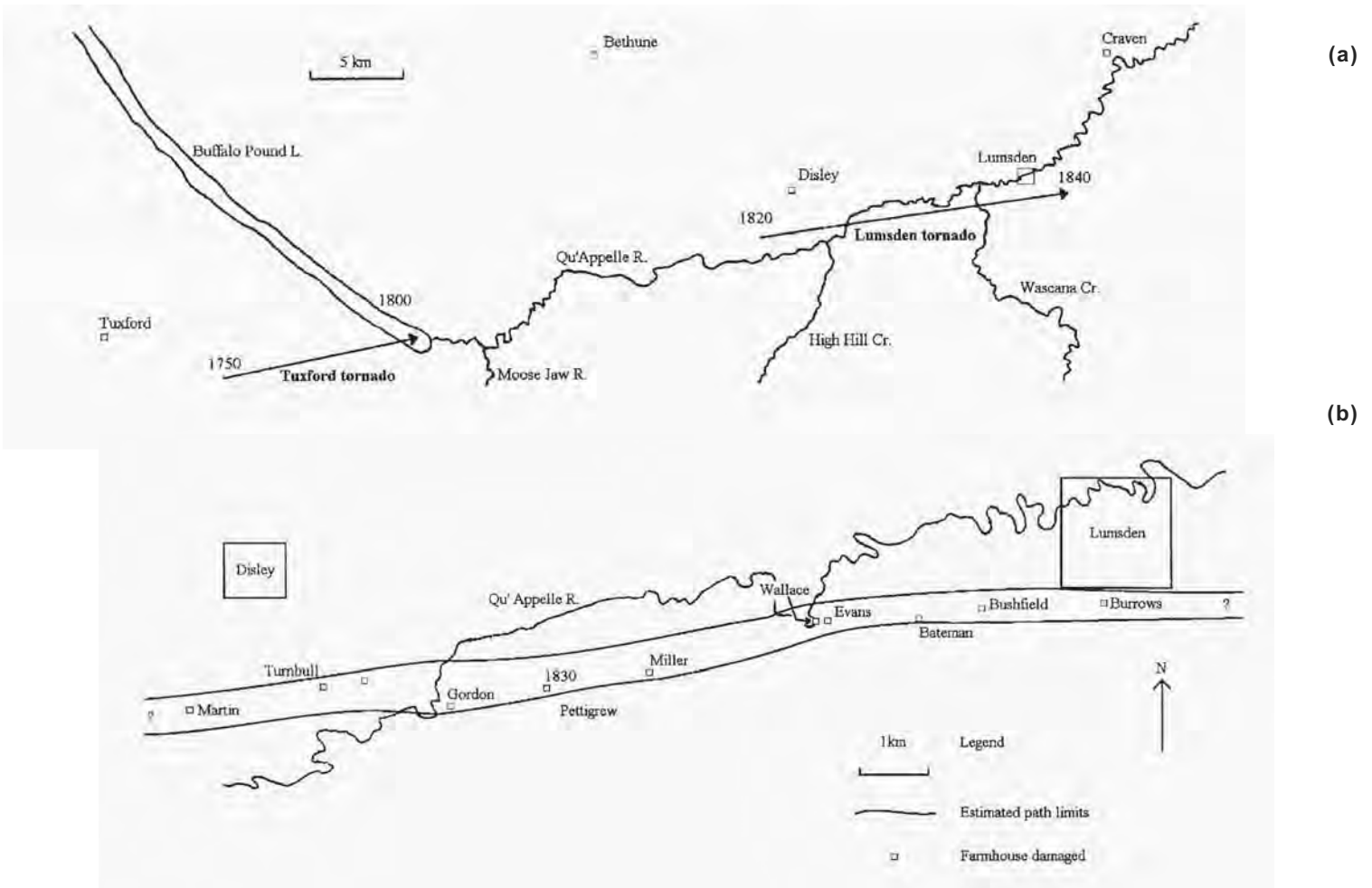
agricultural belt proper. We need a more thorough picture of their occurrence and behaviour if we are to be able to issue timely watches and warnings for them.

**5. 27 August 1973 – Canada’s Largest Hailstones**

The conventional wisdom is that the summer severe weather season in Saskatchewan is all but over by mid-August. The articles by Wojtiw and Lozowski (1975) and Paul (1978) should be compulsory reading for all who need to know about the province’s climate. Suffice it to say here that a vast outbreak of summer storms across southcentral and southeastern Saskatchewan and southern Manitoba occurred on 27 August 1973 (Figure 1) and that numerous other examples are known from late August and into mid-September. This 1973 outbreak fortunately missed the larger cities of the region, Regina, Moose Jaw and Brandon (Manitoba), but in Yorkton alone, damage from hail, flooding and high winds was estimated at \$3 million. The huge hailstones 4.5 inches (11.4 cm) across, which fell near Cedoux, attracted a great deal of public attention, were thoroughly documented, and are still acknowledged as the largest known in Canada.

**6. 9 August 1944 – the Kamsack Disaster**

This devastating tornado is the only other F4 (Fujita 1981) besides the Regina ‘cyclone’ of 1912 to be found in the Saskatchewan tornado record. The property damage in the town of Kamsack on this date was altogether exceptional. Almost three hundred homes and one hundred business premises were either destroyed or badly damaged. The time was unusually late, with the wind raging in at 10.40 p.m., after dark. The storm came from the southwest and brought heavy rain and hail and intense lightning. Two fatal injuries were reported in the town and another person died from injuries received in a wrecked farmhouse 6 km to the northeast. Forty-four others were hurt, many seriously. Houses were lifted into the air and reduced to kindling. One woman in a car saw her house in a flash of lightning; when the next flash came a few seconds later, the house had disappeared from view. Other ‘twisters’ in Saskatchewan have produced as many or more deaths, but apart from the Regina tornado none has caused as much devastation in an urban area as this one in Kamsack. On the same evening, a few hours earlier, severe hail and windstorms had also hit Regina and area, and the district around Quill Lake.



**Figure 2 (a): The Tuxford and Lumsden tornadoes of 17 July 1923  
(b): Details of Lumsden tornado path, 17 July 1923**

## 7. 17 July 1923 – the Lumsden Tornado

This tornado came very close but did not impact the town of Lumsden itself (Figure 2). With eight injuries, eight or nine farmhouses demolished or badly damaged, this one rates a strong F2 on the Fujita scale. Several persons were thrown some distance through the air. Two landed in trees several hundred metres from their homes. Miraculously no one was killed. The track was from west or westsouthwest, at least 18 km long, and 100-500 metres wide. The question arises as to how this tornado would have been rated if it had passed through the town. Very likely it would have levelled a block or two of houses and been assigned F3 status. Doswell and Burgess (1988) found that tornadoes in the U.S.A. in urban areas have increased probability of receiving a higher F value.

The usual large hail and heavy rain were experienced from the parent thunderstorm, which travelled very quickly from the Tuxford area 50 km west of Lumsden to Pasqua Lake 60 km eastnortheast of Lumsden. Several other bad thunderstorms occurred in the general area on the same day and very strong winds accompanied some of them.

## 8. 25 June 1986 – a Very-Long-Track (VLT) Hailstorm

Figure 3 shows the track of an unusually long-lived hailstorm on this date which survived into the early hours of the following day. This VLT storm is the star turn of an article by the writer (Paul 1991) which points out that long-track hailstorms are not as well known as they should be. On 25 June 1986 nearly all the crop damage in Saskatchewan resulted from this single storm “which tracked ESE for 640 km (400 miles), all the way from Alberta to Manitoba”. High winds and hailstones up to golfball size did property damage in a number of villages but rains from the storm were reported at 25 mm or less. Moving at 60 km per hour over the ground, the lifetime of this storm was at least 10 hours. While such longevity for a thunderstorm is rare, other cases are known. The Saskatchewan crop-hail insurance records indicate that hail tracks 300 km or more in length are generated several times a summer on average. It is believed that a hailstorm on 11 August 2000 originating near the Continental Divide west of Great Falls, Montana tracked all the way to the Carlyle area of southeast Saskatchewan. If correct, this would be a VLT case 900 km (560 miles) long with a lifetime of 15-16 hours, a persistent storm indeed.

## 9. 18 August 1996 – the Art Africa Plough Wind

For a number of years, an unusual economic and social enterprise flourished on the Saskatchewan prairie. Art Africa, 20 km southeast of Weyburn, imported stone sculptures and works of art from East Africa, brought artisans from Africa to Canada and functioned as a cultural-exchange centre. The Art Africa ranch hosted parties of schoolchildren and other visitors, workshops, music/dance/drama performances and weekend retreats.

On 18 August 1996 a big event was under way, hundreds of visitors were on the site, and a stage performance complete with band was about to start. Then came an unannounced and unwelcome visitor. A plough wind ahead of a hailstorm tore the roof off the main gallery/showroom, overturned several of the workshop sheds and left the stage in chaos. Luckily there were no serious injuries, but the impact on the establishment was disastrous, with losses estimated at \$150 thousand. The crop-hail claims from the storm (Figure 4) showed that it had already been speeding across the plains for two hours when it hit Art Africa at about 7.30 p.m. The timing could hardly have been worse. People at the ranch were too involved in the activities to keep a close eye on the weather, and in any case there was little that the organizers could have done with very short warning time to mitigate the consequences.

## 10. 29 June 1963 – Saskatchewan’s Most Recent Killer Tornado

In this instance more than forty years ago, a man was killed in one of two farm homes in the Spy Hill area that were totally destroyed. This fatality is the last officially acknowledged death from a tornado in the province. However, disasters by tornado have occurred in both Alberta and Manitoba since then, and Saskatchewan’s four-decade immunity cannot last for ever. The path of the Spy Hill tornado from south to north was appropriate for a severe F3 case and may have been up to 1.3 km wide. The victim and his cousin watched the storm approach from the picture-window of the farmhouse but failed to appreciate its dangers until too late. Both were thrown several hundred metres through the air. Amazingly the cousin survived, though badly injured. This could easily have been an F4 event, and probably would have been assessed as such had it hit an urban area.

### **Discussion**

These ten case studies represent a personal choice. One or two are exceptional but most typify the extensive outbreaks of severe thunderstorms that affect the region. Besides the damage done in such outbreaks, they also provide about half the rain required for satisfactory crop growth. Many questions arise from this work. Two that have received brief acknowledgement in the paper are: How long are the tracks of these travelling severe storms? How early and/or late in the season do they occur?

Two especially topical questions beg further attention at this stage:

1) Are there any temporal trends? For example, are these storms becoming less/more frequent and/or more/less severe?

2) Are we still getting better at predicting them? Are we issuing adequate warnings and responding to their impacts as well as we can? If not, how can we start to move forward again in these respects?



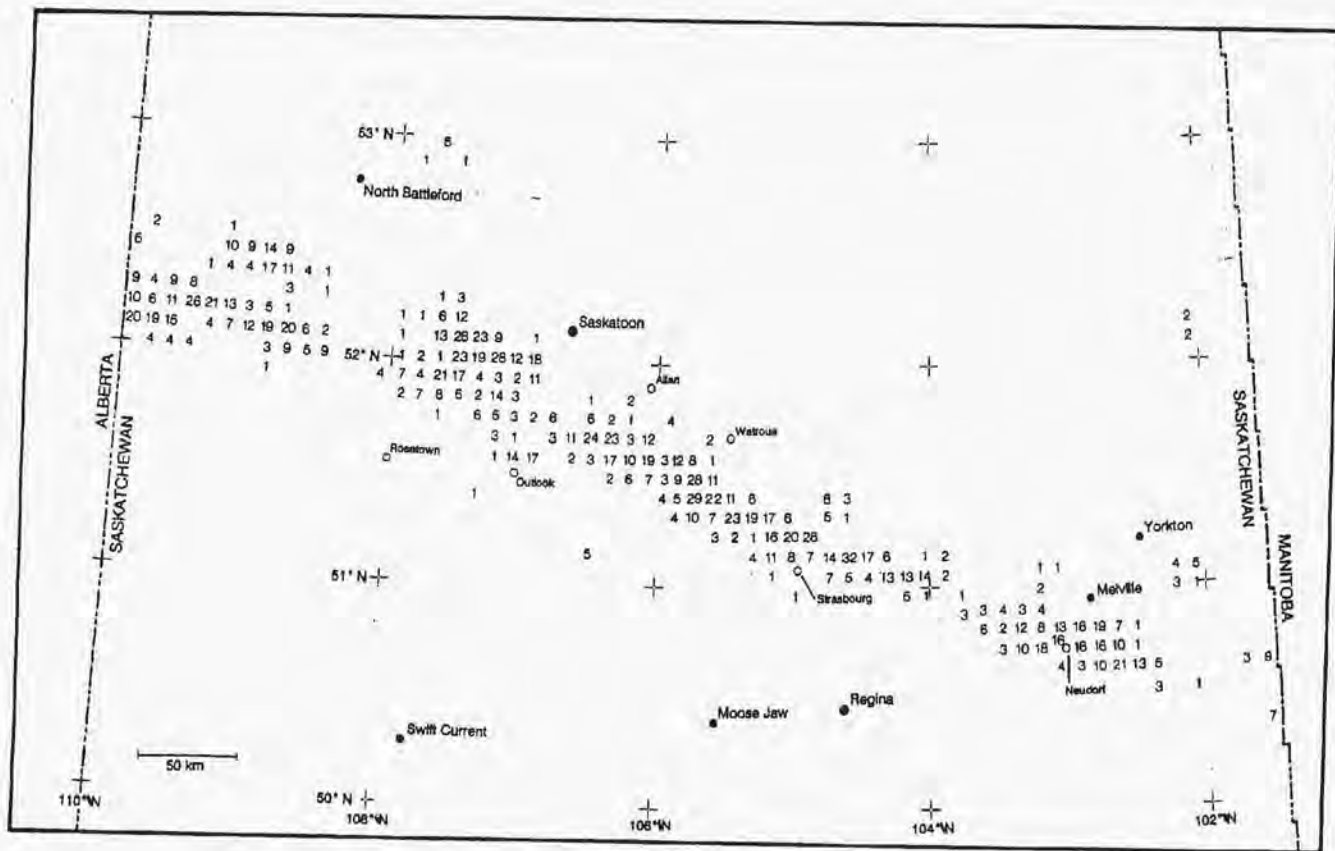


Figure 3: 25 June 1986 - Number of sections per township with damaging hail

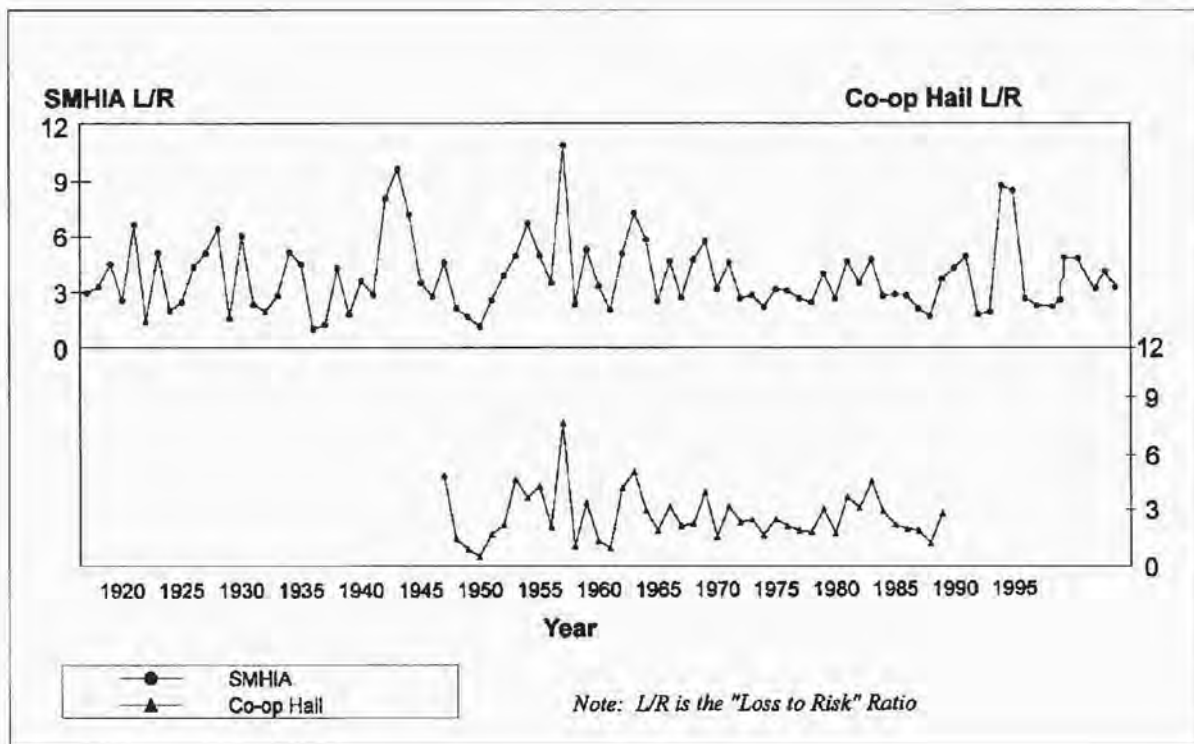


Figure 4: 18 August 1996 - "Art Africa" Plough Wind and Hailstorm

Figure 5: Loss to Risk Series for Saskatchewan Crop-Hail

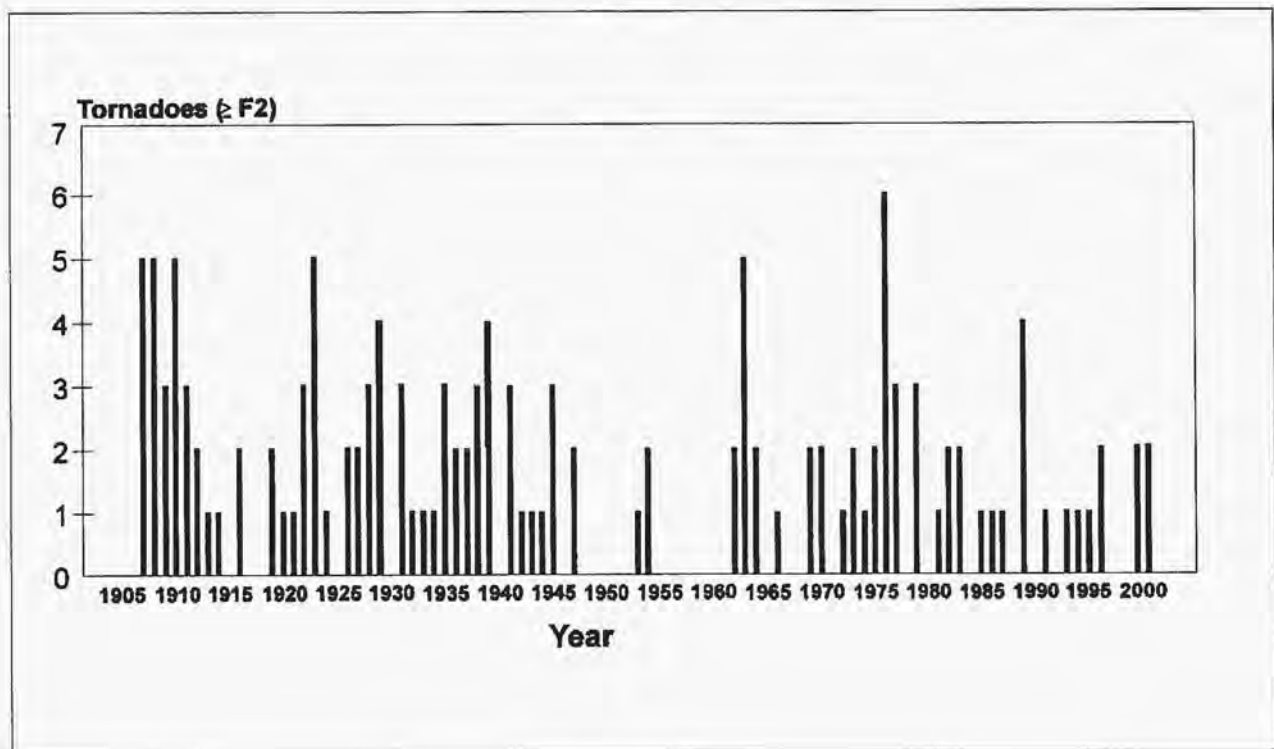
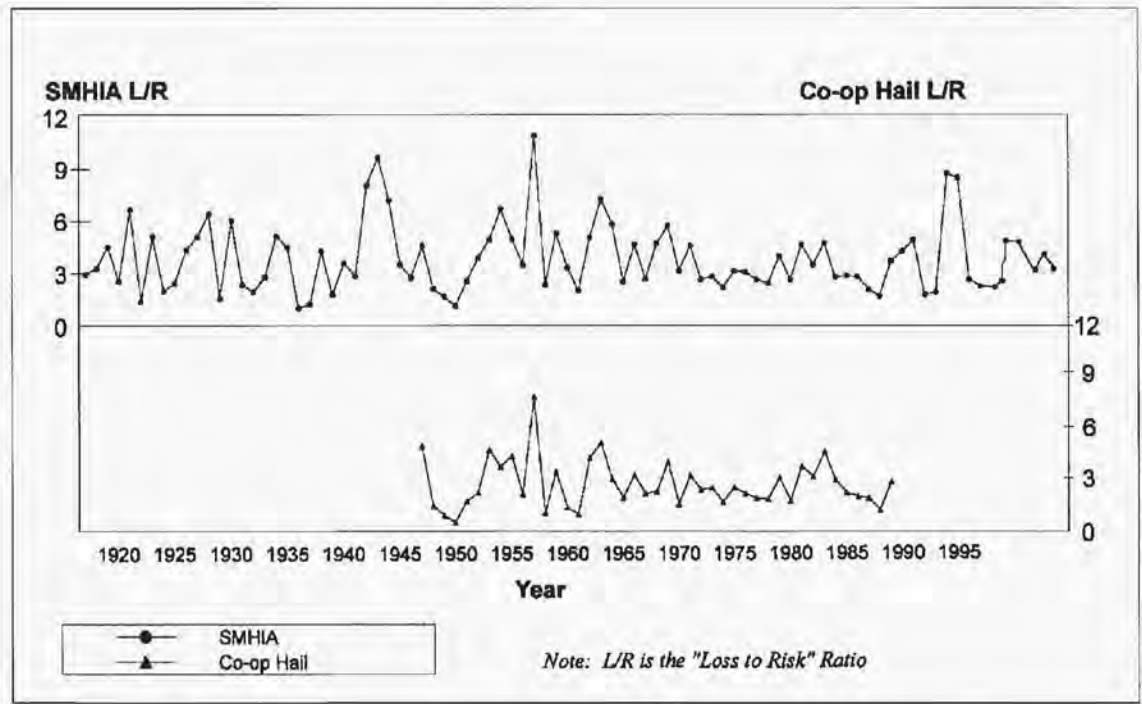


Figure 6: Strong Tornadoes in Saskatchewan, 1906 - 2000

## The Question of Temporal Trends

Data on thunderstorms are among the weaknesses of conventional meteorological observation. Inconsistency in reporting procedures for thunder and lightning plague attempts to establish time trends beyond a generation or so. Thus it may be beneficial to look at proxy variables that can be useful over longer periods. In Saskatchewan time series dating back almost a century concerning two storm elements are available and are used here. The first is a sequence of annual values of average loss-to-risk ratio (L/R) for crop-hail insurance from 1917 to the present, as kept by the Saskatchewan Municipal Hail Insurance Association (SMHIA). The second is a compilation of tornado occurrences from 1906 to 2000 done for Saskatchewan Government Insurance (SGI) by Paul (1995) and McInnis and Paul (2002).

### The Crop-Hail Series

L/R is considered to be a reasonable proxy variable for hailstorm activity in a region. The SMHIA yearly values in per cent for L/R in Saskatchewan are plotted in Figure 5. Since 1947 the Co-operative Hail Insurance Company has published comparable data for its own operations in Saskatchewan. When the Co-op data for L/R for 1947-89, also plotted in Figure 5, are paired with those for SMHIA, there is found to be a high correlation between the two sets, strong support for the view that L/R, despite some constraints (Boone 1974), is an acceptable index of hailstorm occurrence during the farming season.

The extreme values of L/R in the 88-year SMHIA series are 0.98% in 1936 and 10.89% in 1957. The unweighted mean is 3.73% and the median is 3.26%. Thus the frequency distribution is somewhat skewed, the mean exceeding the median due to a rather small number of years with particularly high values for L/R.

Visual inspection suggests that the series is random. Runs tests on the entire series and on each half, 1917-60 and 1961-2004, fail to reject randomness at the 0.05 significance level. Thus preliminary statistical testing fails to identify any significant change over the entire period. However, the mean value for the past 30 years, 1975-2004, is 3.42%. This would represent decreased storminess in summer relative to early and mid-twentieth century. One should be cautious about reading too much into this very basic analysis, but no statistically significant temporal trend emerges.

## The Tornado Series

The Saskatchewan Tornado Project (STP) developed a database on Saskatchewan tornadoes, covering the years 1906-2000 (Paul 1995, McInnis and Paul 2002). Weak tornadoes, especially in the past, are less likely to be reported than strong ones. The list of tornadoes can never be complete, but a much higher proportion of the strong (F2 or greater) tornadoes experienced are likely included in the data base than is the case for weak events. So the STP time series of 127 strong tornadoes is investigated here.

There are numerous constraints both on the quality of tornado data per se (Doswell and Burgess 1988) and on their use as a proxy variable for the incidence of severe thunderstorms. Furthermore, strong tornadoes occur in Saskatchewan with an average frequency of only 1.3-1.4 per year. The annual variability is great. Some years there are none, some years there are several. Even in years when none is reported, there are still severe thunderstorms. Nevertheless, the series (Figure 6) is most interesting.

Visual inspection and a runs test confirm that in a year-to-year sense the STP series is random. However, there is a significant difference at the 0.05 level between the mean values for the two halves of the sequence (1.6 in 1906-52 versus 1.1 in 1953-2000). The series also shows some clustering of active years, as in 1907-12, 1926-29, 1962-64 and 1975-77. If there is any temporal trend over the entire period, it is a negative one. Again caution must be exercised in the interpretation of these data.

## **The Question of Improving Forecasting and Response**

After a century of experience, there can be little doubt that the severe thunderstorm hazard on the Canadian prairies is much better understood. It is in Saskatchewan, though, that forecasting and warning of damaging summer storms is weakest. From the 1960s to the 1990s there took place a tremendous improvement in availability of weather radar and satellite coverage for the province but there is still no year-round upper-air station. Even little Prince Edward Island has one. Saskatchewan is roughly the size of Spain and Portugal combined, so this lack is a serious drawback. Closure of weather offices and cutbacks in specialist weather services in Saskatchewan have resulted in a dramatic reduction of Environment Canada weather employees, such that there is little feedback when severe-weather forecasting and warning is less precise and/or timely than is desirable. The program of trained storm-spotters is only a partial answer. Since the mid-1990s progress has slowed. We continue to do a good job overall but must strive for further improvement.

At the receiving end of forecasts, watches and warnings, there is still room for much more informed responses by local residents. It is surprising how many are still caught completely off guard by sudden storms even when severe weather watches and warnings – and even tornado watches – are in effect. There is an educational void here which needs to be faced. To this date, it has been filled by neither the weather services nor the regional media though both have made commendable efforts to do so. More weather and climate material in our high-school curricula is a crying need.

### Acknowledgements

Thanks are due to Saskatchewan Government Insurance, the Saskatchewan Insurance Managers Association, Environment Canada and the University of Regina for financial support. Ken McInnis's contributions are gratefully recognized, as are SMHIA and Co-op Hail for generously allowing use of their data. The tornado research of Keith Hage in Saskatchewan and the contribution by Geoff Strong (2002) in *CMOS Bulletin SCMO* were great motivators for me to write this brief article.

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#### Notes from the Editor:

1) The present article was presented at the Annual Meeting, Great Plains/Rocky Mountain Division, Association of American Geographers, Laramie, Wyoming, USA, 21-23 September 2005.

2) Alexander Paul was the Editor of the *Climatological Bulletin Climatologique* from 1988 to 1993, a CMOS publication ancestor of the *CMOS Bulletin SCMO*.

**OOPS! OOPS! OOPS!**

### Correction Notice

In the article published by Frank Dempsey entitled "An Example of the Influence of Meteorological Conditions on Ground-level Ozone Concentrations in Southern Ontario" (*CMOS Bulletin SCMO*, Vol.33, No.5, page 133), it seems that a Greek letter got converted to a parenthesis. The correct equation 1 is shown below. We apologize to the author and to our readers for any confusion this error may have caused.



With  $h$  = Planck's constant,  $\nu$  = frequency of radiation, and  $\lambda$  = wavelength of the sunlight, this is just the usual condition for sunlight with wavelength less than 400 nm (in the near ultra-violet region of the spectrum) required to photolyse the nitrogen dioxide molecules into nitric oxide molecules and oxygen atoms.

**Canadian Foundation for Climate and Atmospheric Sciences (CFCAS)  
2005-06 Mid-year Report to CMOS  
November 25, 2005**

Report prepared by Dawn Conway<sup>1</sup>

Key activities since the beginning of July have included:

- Approval of two new network grants for a total of \$8.5 M, bringing the total CFCAS investment in research to \$76.4 million as of December 1, 2005;
- Receipt and evaluation of 86 project grant applications, 10 network grant applications and one request for a network extension;
- Appointment of a Vice-chair of the Board of Trustees
- Preparation of a Brief and its presentation to the House of Commons Finance Committee
- Completion of 2004-05 project and network compliance audits and initiation of three compliance audits for 2005-06;
- A CFCAS-sponsored Symposium on the Research-Policy Interface, November 3-4, 2005;
- Employment of a CFCAS Communications Officer;
- Design and insertion of a CFCAS ad in a special pre-COP11 supplement to the Globe and Mail (publication date November 25, 2005);
- Preparation of 6 posters on CFCAS-funded networks, highlighting the outputs and policy relevance of the work;
- Release of a letter to the Prime Minister promoting action on climate change (November 25, 2005). The letter was endorsed by 49 leading Canadian scholars and administrators.

The new Board of Trustees took office in July 2005. At its first meeting, on September 12, 2005, Dr. Marlon Lewis was elected Vice-chair of the Foundation. The Board will meet again on December 19, 2005.

#### **Outreach**

The Chair of the Foundation has promoted climate science issues and CFCAS's role to federal decision makers, the prime minister and business leaders, at meetings in Ottawa, Montreal and New York State (Fall, 2005).

On October 27 the CFCAS Vice-president presented a brief to the House of Commons Standing Committee on Finance, to promote the Foundation as well as scientific, logistical and financial needs across all climate, atmospheric and oceanic sectors. The brief is available on the CFCAS website [www.cfcas.org](http://www.cfcas.org).



Dawn Conway,  
Executive Director of  
CFCAS

The Executive Director and the Chair of the Board attended the meeting of the International Group of Funding Agencies for Global Change Research (IGFA), in Washington D.C. October 2005. The Executive Director continues to sit on the IGFA Steering Committee. She also represented CFCAS in bilateral discussions on the North American Climate Program (Ottawa, September 2005). The CFCAS Science Officer provided informal advice at interdepartmental meetings, on the development of the new federal granting program for

International Polar Year.

#### **Granting activities**

CFCAS has 19 full network proposals in hand or 'in the pipeline' (13 from 2004-05 and 6 from 2005-06. Some build on the cohesion and achievements of networks due to expire in 2006). The CFCAS budget will allow funding of around 5 of them. The Networks Review Committee met in October 2005 to consider 6 initiatives and will meet three more times over the coming months. The membership is mainly international, to avoid conflicts of interest. The CFCAS Board will make funding decisions on the first 6, in December.

All applicants to the 2005 projects competition were required to submit a letter describing how their proposed work would address federal policy requirements or otherwise clearly benefit Canadian society. The June 2005 competition was the last until new funds become available to the Foundation. There was intense demand and a record number of applications (86). This required that the grants review committee be split into two committees (with a common chairman and a common member, for consistency and coordination of rankings). The two committees met Nov. 17-19 and Nov. 21-22, 2005. The Board had decided in 2004 to focus 75% of remaining CFCAS funds on research networks; hence the success rate for projects will be around 18%. Some highly ranked proposals will not receive support due to lack of funds.

<sup>1</sup> Executive Director, CFCAS



The large number of proposals led to a particularly heavy workload at the Secretariat. A temporary program assistant was hired to help over a 6-7 month period.

#### **Accountability and audit**

The independent auditor completed and submitted the third and final CFCAS project compliance audit from 2004-05. Three compliance audits have been initiated for 2005-06. CFCAS withheld grant payments from four projects where annual or financial reports had not yet been submitted. The reports for three of these were subsequently submitted and two grants reactivated.

#### **International Co-ordination and Profile**

CFCAS continues to support the SPARC international project office (University of Toronto), an international SOLAS Focus 2 Working Group office (Dalhousie University); and the National Secretariat for International Polar Year (University of Alberta). Its support for the latter two expires mid-2006.

#### **Communications**

A draft of the CFCAS Report to Canadians on the Science of Climate Change was completed and additional editing is in progress. The Foundation will delay submission of the report to the Prime Minister until the political situation is more stable.

Two newsletters were published (May 2005 and October 2005). In November CFCAS developed a series of posters focussed on key results from CFCAS-funded networks (six in English, two in French) and displayed them at the CFCAS Research-Policy symposium. They will also be displayed at the December 1 Science Day at the COP parallel meetings, in Montréal.

The Chairman released a letter to the Prime Minister on the science and urgency of action on climate change. This is on the Foundation's website.

CFCAS is very pleased to announce the hiring in November of a Communications Officer. This brings the full time CFCAS staff complement up to five. Ms Diane Hardy has extensive experience in communications related to research and science.

#### **CFCAS Symposium**

The Foundation hosted a symposium on the impact of climate research on policy development and decision-making, in Ottawa, November 3-4, 2005. The event, entitled **From Research to Action**, brought together representatives of the research and policy communities, and others interested in the impact of research investments. It examined how new climate knowledge is shared and used, the respective needs and expectations of policymakers, scientists and the public, and best practices in the communication of science for policy development, public security and strategic planning. A report will be released in 2006.

#### **The immediate future**

The Board has approved a total of \$8.5 million in new funding so far this year and will make decisions on new awards in December. It will hold one more Network Review meeting in 2005-06 and two in 2006-07. (The duration of awards made in 2006-07 will be restricted to 3.5 years unless the Foundation's mandate is extended.) Over the next couple of months, CFCAS will complete and release its *Report to Canadians on the Science of Climate Change*; it will also release a report on the November Symposium on the research-policy interface. The Foundation will increase its efforts to highlight the research accomplishments of the projects and networks it has supported to date. Towards the end of 2005-06, it will let a contract for its (mandatory) mid term performance review. Most importantly, the Foundation will persist in promoting research in climate and atmospheric sciences for a sustained future, the need for support for this and the importance of coordinating the efforts and resources of all sectors, to achieve this.

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## **Expert meeting on the Contribution of Agriculture to the State of Climate**

A workshop organized jointly by the Commission of Agricultural Meteorology (CAgM) of the World Meteorological Organization, Agriculture and Agri-Food Canada, and Environment Canada was held in September 2004 in Ottawa. It was a follow-up to a recommendation by CAgM to create an Expert Team (ET) on the contribution of agriculture to the state of climate, as part of the Open Area Program Group on Climate Change/Variability and Natural Disasters in Agriculture. The decision to assemble an ET on the impact of agriculture on the state of climate is an attempt by CAgM to help minimize the effect of agriculture on climate while producing safe and nutritious food for the world's rapidly growing population.

The workshop gathered 24 participants from 8 countries to discuss different aspects of agricultural production and their impact on climate. This subject has not been an area of

concern in the past because there was more interest in the impact of climate on agriculture; however, it is now becoming important as we seek to ensure environmental sustainability of agricultural practices. Experts in the field were invited to prepare state-of-the-art papers on the following topics:

- agriculture's contribution to climate;
- assessing feedback mechanisms from human activities;
- quantifying greenhouse gas emissions from agriculture;
- improving management practices to reduce GHG emissions and increasing Carbon sequestration;
- awareness building and education.

These presentations stressed the impact of agriculture on weather and climate via geochemical forcing on the atmosphere due to the production/sequestration of GHG as

well as the biophysical forcing of the atmosphere due to land use change. It is now quite clear that a consideration of both of these factors is needed in general circulation models if they are to predict changes in the regional climate correctly. Recommendations on research and development activities in order to improve our understanding of the contribution of agriculture to climate systems were prepared. They are targeted at the research community, international organizations, and policy-makers.

The findings from the workshop will soon be published in a special issue of the International journal of Agricultural and Forest Meteorology. As guest editors, we are very thankful to all contributors and reviewers who contributed greatly to the quality of this publication.

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## CMOS BUSINESS / AFFAIRES de la SCMO

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### 2005-2006 CMOS Tour Speaker

Tour Speaker: **Phil Chadwick**, meteorologist and artist

Title: Weather through the Eyes of Canadian Artists  
Featuring Tom Thomson and the Group of Seven

Abstract: The passion of Canadian artists for weather, as well as the meteorology behind some of the finest work ever produced, will be discussed.

These artists were honest and accurate observers of the weather and the details they recorded on the canvas are enough to reveal a great deal about the location, direction of their subject and the weather they were experiencing.

The science of forensic meteorology will be applied in a fun and exciting look at the work of Canadian artists.

For more information on dates of the conference in your area, please consult CMOS website at: <http://www.cmos.ca>

### Conférencier SCMO itinérant 2005-2006

Conférencier itinérant: **Phil Chadwick**, météorologue et artiste

Titre: La météo à travers le regard des artistes canadiens mettant en vedette Tom Thomson et le Groupe des Sept

Résumé: On discutera de la passion des artistes canadiens pour la météo ainsi que de la météorologie qui est illustrée par certaines des plus belles oeuvres jamais créées.

Ces artistes étaient des fins observateurs du temps, honnêtes et précis, qui ont consigné assez de détails sur leurs toiles pour révéler beaucoup d'informations sur l'emplacement et l'orientation de leur sujet, de même que le temps dont ils faisaient l'expérience.

La science de la météorologie judiciaire sera utilisée pour jeter un regard amusant et excitant sur les oeuvres d'artistes canadiens.

Pour connaître les dates de la conférence dans votre région, prière de consulter le site de la SCMO sur la toile : <http://www.scmo.ca>



Phil Chadwick, CMOS Tour Speaker, (centre) is shown with Teresa Canavan, CMOS Halifax Centre Chair, (left) and Rod Shaw, winner of the Chadwick print awarded as a door prize at the Halifax Conference on September 24, 2005.



**CANADIAN METEOROLOGICAL AND OCEANOGRAPHIC SOCIETY**

**Proposed amendments to CMOS Constitution and By-Laws**

Proposed changes and additions to the By-Laws	Purpose
<p><b>ARTICLE 4 The Executive and Council</b>            The Executive of the Society consists of the President, the Vice-President, the Past President, the Treasurer, the Corresponding Secretary, <del>and the Recording Secretary</del> <b>and the three Councillors-at-Large</b>. It also includes the Executive Director and the Director of CMOS Publications, who are ex-officio and without voting privileges. The Council of the Society consists of the Executive, <del>the three Councillors-at-Large</del> and the Chairpersons of the Centres as well as the Chairpersons of the CMOS committees appointed by Council.</p>	<p>To make the three Councillors-at-large members of the Executive in conformance with current practice.</p>
<p><b>BY-LAW 15 - Committees, Editorial Boards and Working Groups</b>            a) The Committees appointed by the Council are: the Accreditation Committee, the External Relations Committee, the Fellows Committee, <b>the Finance and Investment Committee</b>, the Membership Committee, the Nominating Committee, the Private Sector Committee, the Prizes and Awards Committee, the Publications Coordinating Committee, the School and Public Education Committee, the Scientific Committee, the University and Professional Education Committee and the Weathercaster Endorsement Committee. Ad Hoc and other Committees may be appointed by the Council as required.</p> <p>c) The editorial boards appointed by the Council are: ATMOSPHERE-OCEAN Editorial Board and CMOS Bulletin SCMO <b>Editorial Board</b>. The former shall contain representation for meteorology and oceanography, while the latter shall contain co-editors for at least climatology and operational meteorology. The editor of the Annual Review is appointed by the Council.</p>	<p>To make the former ad hoc Finance and Investment Committee a permanent Council-appointed Committee</p> <p>Minor editorial change.</p>

Note: Words in bold italic are new words added to the original By-Laws.



**CANADIAN METEOROLOGICAL AND OCEANOGRAPHIC SOCIETY**

**Proposed amendments to CMOS Constitution and By-Laws**

Proposed changes and additions to the By-Laws (Continued)	Purpose
<p><b>APPENDIX II TO BY-LAWS</b></p> <p><b>DUTIES OF ELECTED AND APPOINTED OFFICERS OF THE SOCIETY</b></p> <p>1. The duties of the Executive <del>and Councillors-at-large</del> shall be:</p> <p><b>c) The Treasurer</b></p> <p><del>i) The Treasurer shall, on behalf of the Society, open and maintain such bank accounts as may be necessary for the investment and day-to-day handling of Society funds.</del></p> <p><i>i) The Treasurer shall supervise the book-keeping by the Society's Business Office of the books of accounts of the Society and ensure that they are maintained in accordance with the financial guidelines approved from time to time by Council and in a manner agreeable to the Auditor.</i></p> <p><i>ii) The Treasurer shall <del>have the authority</del> <b>authorize the Business Office</b> to disburse the funds of the Society up to a limit for single payments specified by Council from time to time. Disbursements exceeding this limit shall require a decision of the Executive duly recorded at a meeting of the Executive.</i></p> <p><i>iii) The Treasurer shall <b>supervise the management of</b> the investments of the Society in accordance with Council directives.</i></p> <p><i>iv) The Treasurer shall supervise the collection of all accounts due to the Society by the Business Office and that Office's preparation of the accounts of the Society for audit. The Treasurer shall ensure that the Business Office makes available to the Auditor all such books and documents relating to the Society as the Auditor may require in accordance with By-Law 16(b).</i></p> <p><i>v) The Treasurer shall provide periodic financial reports to the Executive and the Council and, working with the Business Office, shall prepare the annual budget for consideration by the Council.</i></p> <p><i>vi) The Treasurer shall supervise the preparation of, <del>and sign</del> all financial statements and <del>other Provincial as well as Revenue Canada</del> information returns for the Society. .</i></p> <p><i>vii) The Treasurer shall recommend an auditor to the Council.</i></p> <p><i>viii) The Treasurer shall carry out other financial functions for the Society <del>such as originating subventions for Centres, drawing up contracts and such other functions as may become necessary from time to time.</del></i></p> <p><b>f) Councillors-at-large</b></p> <p>Councillors-at-large are to be assigned specific responsibilities by either the Council or Executive in consideration of the need to:</p> <p>i) liaise with other related bodies,</p> <p>ii) serve <del>on an ad hoc</del> <b>the</b> Finance and Investment Committee, a Communications Committee, represent Council on the Scientific Program Committee of Congresses or</p> <p>iii) undertake special studies or analysis.</p>	<p>To reflect change in status of Councillors-at-large</p> <p>No longer a Treasurer duty. Delete and re-number remaining paragraphs.</p> <p>To give the Business Office the authority it has exercised for many years to disburse funds and manage investments within limits set by Council and the supervision of the Treasurer.</p> <p>To reflect current practice.</p> <p>To reflect current practice.</p> <p>To reflect change in committee status.</p>

Note: Words in bold italic are new words added to the original By-Laws



## SOCIÉTÉ CANADIENNE DE MÉTÉOROLOGIE ET D'OCÉANOGRAPHIE

### Modifications proposées à la constitution et aux règlements de la SCMO

Modifications et additions proposées à la constitution	Objectif
<p><b>ARTICLE 4 - Le bureau et le conseil d'administration</b>            Le bureau d'administration de la Société se compose d'un président(e), d'un vice-président, d'un président sortant, d'un trésorier, d'un secrétaire-correspondant, <del>et d'un secrétaire d'assemblée</del> <b>et les trois conseillers généraux</b>. Le bureau d'administration inclut le directeur exécutif et le directeur, publications SCMO, qui sont membres à titre d'office et sans privilège de vote. Le conseil d'administration de la Société se compose des membres du bureau d'administration, <del>des trois conseillers</del>, et des présidents des Centres, ainsi que des présidents des comités nommés par le conseil d'administration.</p>	<p>Pour inclure les trois conseillers généraux comme membres du bureau d'administration afin d'être conforme aux pratiques courantes.</p>
<p><b>RÈGLEMENT 15 - Comités, conseils de rédaction, et groupes de travail</b>            a) Le conseil d'administration désigne les comités suivants : le Comité d'accréditation, le Comité des relations extérieures, le Comité des Membres émérites, <b>le Comité sur les finances et les investissements</b>, le Comité d'adhésion, le Comité des mises en candidature, le Comité du secteur privé, le Comité des prix et honneurs, le Comité coordinateur des publications, le Comité d'éducation publique et scolaire, le Comité scientifique, le Comité d'éducation professionnelle et universitaire et le Comité d'agrémentation des présentateurs météo. Le conseil d'administration peut selon le besoin désigner d'autres comités et des comités spéciaux.</p> <p>c) Le conseil d'administration désigne les conseils de rédaction suivants: le conseil de rédaction d'ATMOSPHERE-OCEAN et le conseil <b>de rédaction</b> du CMOS Bulletin SCMO. Les membres du premier conseil doivent être désignés de manière à représenter la météorologie et l'océanographie, alors que le deuxième conseil devra inclure des co-éditeurs représentant la climatologie et la météorologie opérationnelle. L'éditeur de la Revue Annuelle est désigné par le Conseil d'administration.</p>	<p>Pour ajouter le comité sur les finances et les investissements à la liste des comités désignés par le conseil d'administration.</p> <p>Changement éditorial mineur</p>

Avis: Les mots en caractères gras et italiques sont ajoutés aux règlements.



# SOCIÉTÉ CANADIENNE DE MÉTÉOROLOGIE ET D'OCÉANOGRAPHIE

## Modifications proposées à la constitution et aux règlements de la SCMO

Modifications et additions proposées à la constitution (Suite)	Objectif
<p><b>APPENDICE II AUX RÈGLEMENTS</b></p> <p><b>FONCTIONS DES MEMBRES ÉLUS ET DÉSIGNÉS DE LA SOCIÉTÉ</b></p> <p>1. Les fonctions du bureau d'administration <del>et des conseillers généraux</del> sont :</p> <p>c) <b>Le trésorier</b></p> <p>i) <del>Le trésorier ouvre et maintient au nom de la Société, des comptes en banque jugés nécessaires pour l'investissement des fonds de la Société et pour les transactions quotidiennes.</del></p> <p>ii) Le trésorier doit surveiller la tenue des livres comptables par le bureau d'affaires de la Société et s'assurer qu'ils sont tenus d'une manière en accord avec les lignes directrices approuvées de temps à autre par le conseil d'administration et jugée acceptable par le vérificateur.</p> <p>iii) Le trésorier a le pouvoir <b>d'autoriser le bureau d'affaires</b> de déboursier des fonds de la Société pour des montants ne dépassant pas une certaine limite, spécifiée et revue de temps à autre par le Conseil. Les montants dépassant cette limite nécessitent une résolution dûment inscrite au compte rendu d'une des réunions du bureau d'administration.</p> <p>iiii) Le trésorier doit superviser <del>la gérer</del> <b>la gestion</b> <del>les des</del> investissements de la Société en accord avec les directives du conseil d'administration.</p> <p>v) Le trésorier doit surveiller la tenue des comptes de la Société par son bureau d'affaires, et la préparation par ce même bureau du journal comptable soumis au vérificateur. Le trésorier doit s'assurer que le bureau d'affaires fournit au vérificateur tous les livres et documents de la Société demandés par celui-ci, conformément au règlement 16(b).</p> <p>vi) Le trésorier doit préparer des rapports financiers périodiques à l'intention de l'Exécutif et du conseil d'administration et doit préparer le budget annuel pour examen par le conseil d'administration.</p> <p>vii) Le trésorier doit surveiller la préparation <del>et signer</del> les états financiers de la Société et autres renseignements requis par <del>la province et</del> Revenu Canada.</p> <p>viii) Le trésorier doit recommander un vérificateur au Conseil d'administration.</p> <p>ix) Le trésorier doit effectuer d'autres tâches financières au nom de la Société, <del>comme l'initiation d'octroi de subventions aux Centres, la rédaction de contrats et autres tâches</del> telles que requises de temps à autres.</p> <p>f) <b>Conseillers généraux</b></p> <p>Les conseillers généraux seront mandatés pour des tâches spécifiques soit par le conseil ou par le bureau d'administration afin :</p> <p>i) d'assurer une liaison avec d'autres organismes reliés;</p> <p>ii) de siéger <del>à un</del> <b>au</b> comité <del>ad hoc</del> sur les finances et les investissements, un comité des communications, de représenter le Conseil au comité du programme scientifique des Congrès; ou</p> <p>iii) de mener des études et des analyses spéciales.</p>	<p>Pour être conforme au changement de statu des conseillers généraux.</p> <p>Pour enlever un fonction obsolète</p> <p>Pour donner au bureau d'affaires l'autorité qu'il a exercé pendant plusieurs années de déboursier des fonds et de gérer les investissements de la Société à l'intérieur des limites spécifiés par le conseil et sous la supervision du trésorier.</p> <p>Pour être conforme aux pratiques courantes.</p> <p>Pour être conforme aux pratiques courantes.</p> <p>Pour être conforme au changement du statut du comité.</p>

Avis: Les mots en caractères gras et italiques sont ajoutés aux règlements.

## Appel de candidatures pour la prestigieuse médaille dans le domaine des sciences de la mer au Canada

Il est maintenant temps de soumettre les candidatures pour la prochaine remise de la médaille Timothy R. Parsons, le nouveau prestigieux prix du Canada décerné aux scientifiques s'étant distingués dans un domaine multidisciplinaire lié aux sciences de la mer. Ce prix a été créé par le ministère des Pêches et des Océans (MPO) en 2004 et la prochaine médaille sera remise lors du congrès de la Société canadienne de météorologie et d'océanographie (SCMO) à Toronto en mai 2006.

Les scientifiques qui sont admissibles doivent oeuvrer au sein d'une institution canadienne dans l'intérêt de la science. Les candidatures peuvent avoir pour but de faire reconnaître l'ensemble d'une carrière ou une réalisation exceptionnelle récente. Afin de faciliter le processus de mise en candidature, un formulaire en ligne a été créé à l'adresse suivante : [http://www.dfo-mpo.gc.ca/science/awards/persons\\_f.htm](http://www.dfo-mpo.gc.ca/science/awards/persons_f.htm).

La médaille a été nommée en l'honneur de M. Tim Parsons, professeur émérite à l'Université de la Colombie-Britannique et chercheur honoraire à l'Institut des sciences de la mer de Sidney, en Colombie-Britannique. Au cours de sa carrière, il a mis au point une nouvelle approche écosystémique intégrant des données océanographiques pour la gestion des pêches. Les précédents récipiendaires de la médaille sont M. Parsons lui-même ainsi que M. Daniel M. Ware qui s'est mérité la médaille pour sa remarquable contribution à l'océanographie des pêches.

La date limite pour les mises en candidatures est le **28 février 2006**. Tout Canadien peut proposer un candidat potentiel. La médaille est remise chaque année à condition que le comité de sélection ait identifié un récipiendaire méritoire. Les candidatures de l'année précédente sont automatiquement réexaminées. Les lettres d'appui de la part de collègues seront acceptées, mais elles ne sont pas nécessaires. Il importe que chaque mise en candidature soit appuyée par une déclaration concise et exhaustive indiquant le bien-fondé de la contribution apportée par la personne proposée aux sciences multidisciplinaires de la mer. La déclaration doit faire référence à des activités d'enseignement, à des idées importantes, à des activités démontrant le leadership et une liste de publications. L'information d'appui doit comprendre le résumé des réalisations de la personne et une déclaration montrant comment ses réalisations ont contribué à l'avancement des sciences multidisciplinaires de la mer.

Veillez utiliser le formulaire en ligne à : [http://www.dfo-mpo.gc.ca/science/awards/persons\\_f.htm](http://www.dfo-mpo.gc.ca/science/awards/persons_f.htm) ou faites parvenir les candidatures à l'adresse suivante :

Comité de la médaille Timothy R. Parsons  
200, rue Kent, bureau 8W144  
Ottawa (Ontario) K1A 0E6

## Call for Nominations for Prestigious Canadian Ocean Sciences Medal

It is time to send in nominations for the next Timothy R. Parsons Medal, Canada's prestigious new award for distinguished accomplishments in multidisciplinary facets of ocean sciences. The Department of Fisheries and Oceans (DFO) established the award in 2004 and the next award will be presented at the Canadian Meteorological and Oceanographic Society (CMOS) Congress in May 2006 in Toronto.

Eligible scientists are those working for Canadian institutions for the benefit of Canadian science, and the nomination can be for a lifetime's body of work or for a recent outstanding achievement. To facilitate nominations, an online nomination form has been created, at [http://www.dfo-mpo.gc.ca/science/Awards/Persons\\_e.htm](http://www.dfo-mpo.gc.ca/science/Awards/Persons_e.htm).

The award is named for Dr. Tim Parsons, Professor Emeritus at the University of British Columbia and an Honorary Research Scientist at the Institute of Ocean Sciences in Sidney, B.C. His lifetime work established a new ecosystem approach for the management of fisheries using oceanographic information. Previous recipients included Dr. Parsons himself, and Dr. Daniel M. Ware, for his outstanding contribution to the field of fisheries oceanography.

The deadline for nominations is **February 28, 2006**. Any Canadian may nominate a potential recipient. The award is granted annually, contingent on the selection committee finding a worthy recipient, and nominees from the previous year are automatically reconsidered. Letters of support from co-nominators are welcome, but not necessary. Each nomination should be supported by a concise, comprehensive statement indicating the merits and contributions made by the nominee to multidisciplinary ocean science. The statement should be supported by references to significant ideas, publications, teaching activities and program leadership. The supporting information should include a summary of the accomplishments of the individual and a statement indicating how these accomplishments were connected with the progress of multidisciplinary ocean science.

Please use the on-line form at [http://www.dfo-mpo.gc.ca/science/Awards/Persons\\_e.htm](http://www.dfo-mpo.gc.ca/science/Awards/Persons_e.htm), or send nominations to:

Timothy R. Parsons Medal Committee  
Stn. 8W144 – 200 Kent Street  
Ottawa, Ontario, K1A 0E6



40<sup>th</sup> Annual CMOS Congress

May 29- June 1, 2006  
Toronto, Ontario, Canada

Early Registration Deadline: April 15, 2006

The Canadian Meteorological and Oceanographic Society (<http://www.cmos.ca>) will hold its 40<sup>th</sup> Congress from May 29 to June 1, 2006, at the Sheraton Hotel in downtown Toronto, Ontario, Canada. The Congress website is <http://www.cmos2006.ca> and the Congress email contact is [cmos2006@cmos.ca](mailto:cmos2006@cmos.ca).

This year's Congress has the theme "**Weather, Oceans & Climate: Exploring the Connections.**"

The Congress will feature:

- Science sessions that highlight top Canadian and international research contributions to meteorology, oceanography, atmospheric chemistry and pollution, remote sensing, climate modelling, and weather and climate forecasting.

- Plenary presentations by leading researchers.

- An evening general-interest lecture, open to the public, on the theme of climate change.

- Outreach sessions that focus on education, on communicating our research results to the media, on policy implications of our research, and on career opportunities for young scientists.

- A banquet, a hosted lunch, awards of CMOS prizes, and the CMOS Annual General Meeting.

If you are an exhibitor, an educator, a member of the media, or anyone else with an interest in the meeting, please visit the Congress website (<http://www.cmos2006.ca>) and

40<sup>e</sup> Congrès annuel de la SCMO

du 29 mai au 1<sup>er</sup> juin 2006  
Toronto, Ontario, Canada

Date limite pour l'inscription hâtive: 15 avril 2006

La Société canadienne de météorologie et d'océanographie (<http://www.scmo.ca>) tiendra son 40<sup>e</sup> Congrès du 29 mai au 1<sup>er</sup> juin 2006 à l'hôtel Sheraton au centre-ville de Toronto, Ontario, Canada. Le site du Congrès est le <http://www.cmos2006.ca> et le contact par courriel pour le Congrès est le [cmos2006@cmos.ca](mailto:cmos2006@cmos.ca).

Le thème général du Congrès de cette année est "**Météo, océans et climat: explorer les liens**".

Parmi les événements qui se dérouleront durant le Congrès soulignons les événements suivants :

- Des sessions scientifiques mettant l'accent sur les meilleures contributions canadiennes et internationales à la recherche en météorologie, océanographie, chimie de l'atmosphère, pollution atmosphérique, télédétection, modélisation du climat et prévision météorologique et climatique.

- Des présentations plénières données par des chercheurs de premier plan.

- En soirée, une conférence d'intérêt général ouverte au public et portant sur le thème du changement climatique.

- Des ateliers de sensibilisation qui mettront l'accent surtout sur l'éducation, la communication des résultats de nos recherches aux médias, les conséquences de nos recherches sur le plan politique et les possibilités de carrière pour les jeunes scientifiques.

- Un banquet, un déjeuner hommage, l'attribution des prix SCMO et l'assemblée générale annuelle de la SCMO.

Si vous êtes un exposant, un éducateur, un membre des médias ou toute autre personne intéressée par ce rassemblement, veuillez visiter le site du Congrès

The poster features a central image of a globe with a ship on the ocean. Text on the poster includes: "40<sup>th</sup> CMOS CONGRESS", "WEATHER, OCEANS & CLIMATE Exploring the Connections", "MÉTÉO, OCÉANS ET CLIMAT Explorer les liens", "40<sup>e</sup> CONGRÈS DE LA SCMO", "Toronto, Ontario", "29 May/mai - 1 June/juin, 2006", and contact information for the Canadian Meteorological and Oceanographic Society.

contact us at [cmos2006@cmos.ca](mailto:cmos2006@cmos.ca) for further information.

(<http://www.cmos2006.ca>) et nous contacter à [cmos2006@scmo.ca](mailto:cmos2006@scmo.ca) afin d'obtenir de plus amples renseignements.

## 40<sup>th</sup> Annual CMOS Congress Fee Schedule Droit d'inscription pour le 40<sup>e</sup> Congrès annuel de la SCMO

Early Registration Deadline: **April 15, 2006**  
Date limite pour l'inscription hâtive: **15 avril 2006**

Registration Type	Early Registration Price	Late Registration Price	One-Day Ticket Price
CMOS Members	\$ 475	\$ 530	\$ 160
CMOS Students	\$ 230	\$ 257	\$ 115
CMOS Retired/Life Members	\$ 235	\$ 260	\$ 115
Non-members	\$ 535	\$ 600	\$ 190
Student Non-members	\$ 257	\$ 290	\$ 135
Teachers' Day			\$ 55

### Local Arrangements Committee / Comité local d'organisation

<b>David Hudak:</b> Chair / Président (905) 833-3905, ext. 242	<b>Chris McLinden:</b> Vice-president and Executive assistant Vice-président et assistant exécutif (416) 739-4932
<b>Sylvie Gravel:</b> Facilities Convenor and member of the Sponsorship and Social Sub-Committees / Responsable des aménagements et membre des sous-comités des commandites et activités sociales (416) 739-4126	<b>Sarah Wong:</b> Secretary / Secrétaire E-mail Secretary / Secrétaire des courriels (416) 739-4426
<b>William Schertzer:</b> Treasurer / Trésorier (905) 336-4770	<b>Paul J. Kushner:</b> Chair, Scientific Program Committee (SPC) Président du comité du programme scientifique (CPS) (416) 946-3683
<b>Chris Fletcher:</b> Executive Assistant, SPC Assistant exécutif, CPS (416) 946-0610	<b>Natasha Ramsahai:</b> Education Day Coordinator Coordonnatrice du jour pour les professeurs (416) 368-2986
<b>Claire Martin:</b> Education Day Assistant Assistante du jour pour les professeurs	<b>Heather Mackey:</b> Communications Sub-committee Member / Membre du sous-comité des communications (416) 739-4766
<b>Dawn McDonald:</b> Communications Sub-committee Member Membre du sous-comité des communications (416) 739-4331	<b>Angus Ferguson:</b> Publications / Publications (416) 739-4765
<b>Nick Czernkovitch:</b> Advertising / Annonces (416) 816-2832	<b>Oscar Koren:</b> Exhibits Convenor/ Responsable des expositions Sponsorship Sub-Committee Member / Membre du sous-comité des commandites (905) 669-2365
<b>Irene Rubinstein:</b> Local Exhibits Co-ordinator Coordonnatrice locale des expositions (416) 736-0900, ext. 233	<b>Rebecca Williams:</b> Web Co-ordinator Coordonnatrice pour la toile (416) 739-4957
<b>Tom McElroy:</b> Chairman, Toronto CMOS Centre, Head of Communications & Head of Sponsorship Sub-Committees Président, Centre de Toronto, Chef des sous-comités des communications et des commandites (416) 739-4630	<b>Diane Pendlebury:</b> Social Committee Lead Chef du comité des activités sociales (416) 946-7543
<b>Carr McLeod :</b> Member-at-large / Conseiller, Sponsorship Sub-Committee Member / Membre du sous-comité des commandites (416) 739-4536	<b>Rebecca Wagner:</b> Member-at-large / Conseiller, Sponsorship Sub-Committee Member / Membre du sous-comité des commandites (416) 739-4941
<b>Jaymie Gadal:</b> A/V Coordinator / Coordonnateur pour les audiovisuels (416) 739-5949	<b>Ron Bianchi:</b> Member-at-large / Conseiller (416) 946-4735

as of January 18, 2006

**New Chair**

**Canadian National Committee for SCOR**

The Canadian National Committee (CNC) for SCOR is pleased to confirm that effective January 1, 2006 Gordon McBean will become its new Chair, replacing Björn Sundby at the completion of his three-year term. Dr. Sundby will continue to serve as a member of CNC/SCOR as past-Chair, and he continues to serve as President of international SCOR for an additional three years.



Dr. Gordon McBean,  
new Chair for SCOR

Gordon's early career spanned a wide variety of interests in MSC, including boundary layer research, hydrometeorology and environmental impact research, and weather forecasting. Gordon has received many distinguished awards (MSC Patterson Medal, CMOS President's Prize, EC Jim Bruce Award) and has been elected a Fellow of the Royal Society of Canada, the Canadian Meteorological and Oceanographic Society and the American Meteorological Society. Gordon has chaired and been a Member of enumerable national and international scientific committees, including Chair of the International Scientific Committee for the World Climate Research Programme, and he has published extensively. Gordon received his Ph.D. in Physics and Oceanography from the University of British Columbia. Gordon may be reached at: [gmcbear@uwo.ca](mailto:gmcbear@uwo.ca)

**The International Year of Planet Earth (IYPE)**



IYPE was declared at the United Nations of the 20<sup>th</sup> of December 2005. IYPE is scheduled for 2008, with ramp up in 2007 and down in 2009. IYPE will be an excellent opportunity for us all to further demonstrate the importance of Earth Sciences to society. For more information, please consult: <http://www.esfs.org/>

**Coastal Zone Canada 2006**

CZC 2006 and the Youth Forum have been rescheduled for 12-18 August 2006 in Tuktoyaktuk, Northwest Territories. The theme is 'Arctic Change and Coastal Communities'. While the focus is on coastal and ocean issues in the north, contributions from coastal areas around the world are encouraged, recognizing that many of the drivers of coastal change, and the adaptation of people to them, are common to many parts of the world. For more information, please access <http://www.czc06.ca>.

**Free or Fee**

"The Governmental Data Ownership Debate", a white paper prepared by the Geospatial Information and Technology Association (GITA), examines the issue of governments charging for data that has been collected with public funds. The paper is available at [http://www.gita.org/resources/whitepapers/Free\\_or\\_fee.pdf](http://www.gita.org/resources/whitepapers/Free_or_fee.pdf).

**CMOS Accredited Consultants  
Experts-Conseils accrédités de la SCMO**

**Gamal Eldin Omer Elhag Idris, C.Chem., MCIC**

Chemical Oceanography,  
Pollution Control and Water Technology

402 Delaware Avenue  
Toronto, Ontario M6H 2T8 Canada  
Tel: (416) 516-8941 (Home)  
Email; [omer86@sprint.ca](mailto:omer86@sprint.ca)

**Douw G. Steyn**

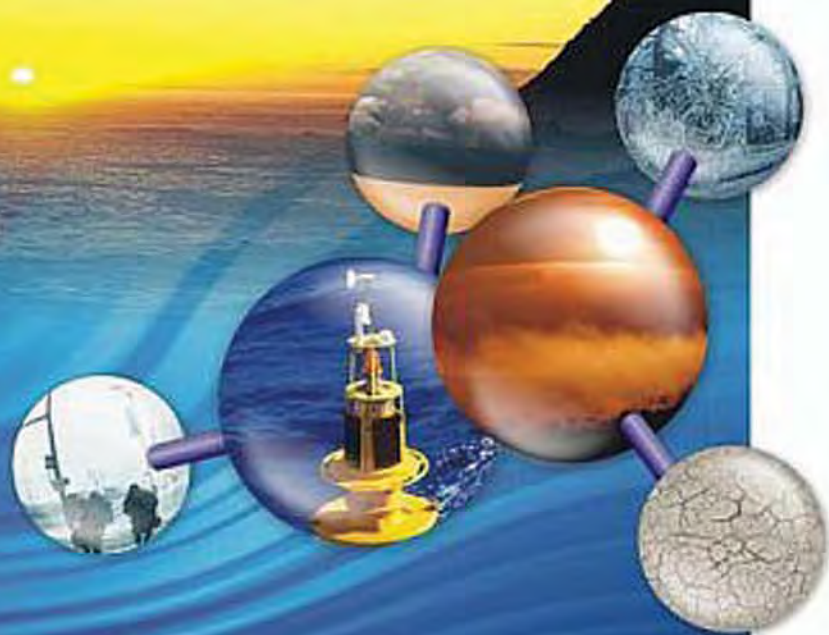
Air Pollution Meteorology  
Boundary Layer & Meso-Scale Meteorology

4064 West 19th Avenue  
Vancouver, British Columbia, V6S 1E3 Canada  
Tel: (604) 822-6407; Home: (604) 222-1266

# 40<sup>th</sup> CMOS CONGRESS

WEATHER, OCEANS & CLIMATE  
Exploring the Connections

MÉTÉO, OCÉANS ET CLIMAT  
Explorer les liens



## 40<sup>e</sup> CONGRÈS DE LA SCMO



Toronto, Ontario

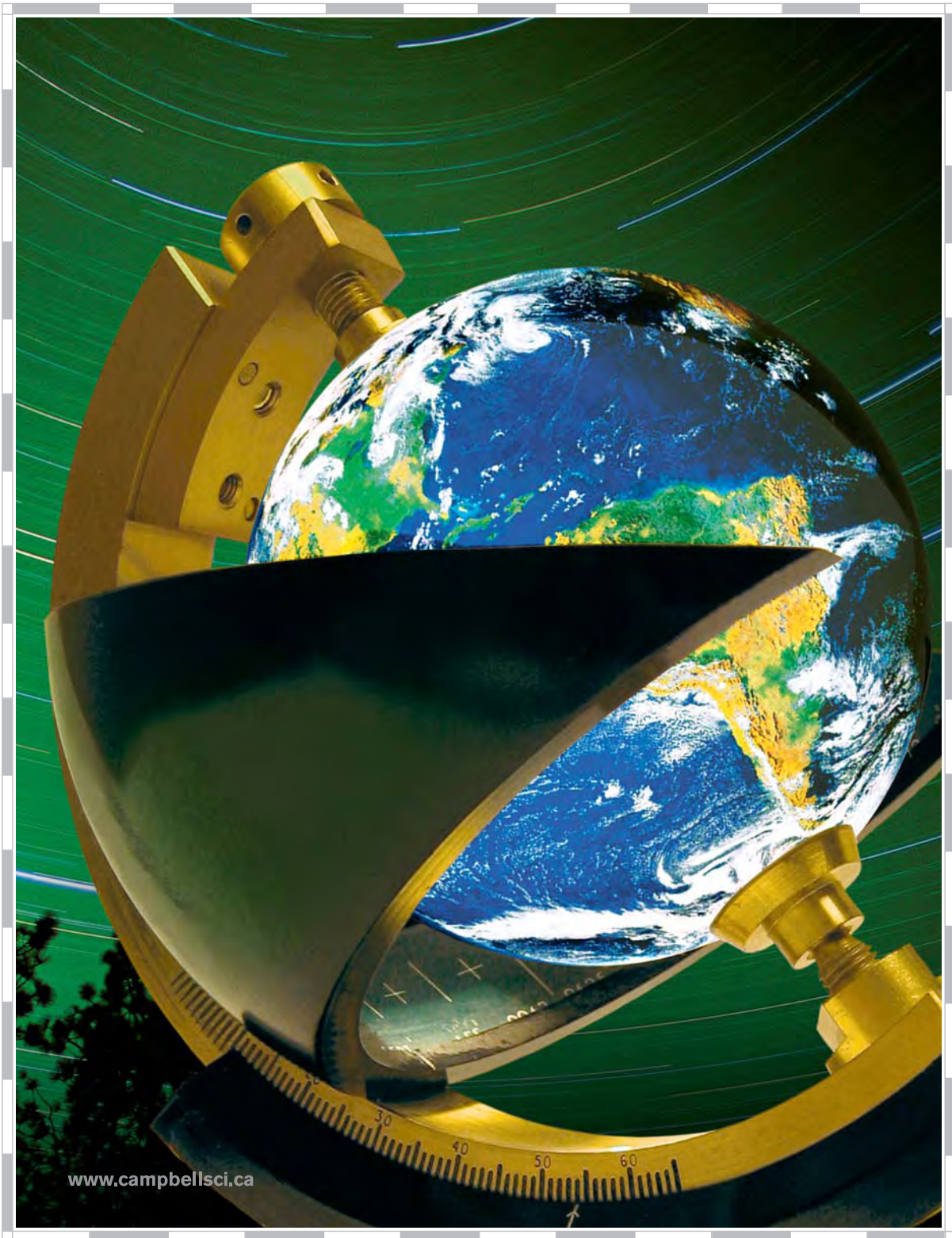
29 May/mai - 1 June/juin, 2006

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

web : [www.cmos2006.ca](http://www.cmos2006.ca)

email/courriel : [cmos2006@cmos.ca](mailto:cmos2006@cmos.ca)





measuring everywhere | mesurer partout

