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La Société canadienne de météorologie et d'océanographie

CMOS BULLETIN SCMO

February / février 2005 Vol.33 No.1

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....from the President's Desk

CMOS friends and colleagues:

The extreme ocean and atmosphere events that marked the transition from 2004 to 2005 around the world have once again underlined the challenges and impacts of our disciplines. On a happier note, as we begin 2005 we also have the opportunity to consider those among our colleagues who are making outstanding contributions to Canadian meteorology and oceanography, and to nominate them for the awards or prizes that they deserve. Please see the list of CMOS prizes and awards, together with the nomination procedure, available on our *website (www.cmos.ca) and in the previous issue of our CMOS Bulletin SCMO* (Vol. 32, No. 6, page 180). Your nominations should be sent to our Executive Director by 18 February. We are also calling for nominations for CMOS Fellows, Honorary Fellows, and the Neil J. Campbell Medal for Exceptional Volunteer Service. As indicated on our website and in the enclosures with the previous *CMOS Bulletin SCMO* mailing, the deadline for these nominations to be received by our Executive Director is 15 March. As similarly publicized, students are also invited to apply for The Weather Network / MétéoMédia Scholarship (deadline 28 February) and the CMOS – Weather Research House Scholarship Supplement (deadline 15 April).

The following is a brief update on items that have been discussed at our recent Executive and Council meetings. We are moving ahead on reciprocal relations with some other societies. CMOS Council has approved the offering of Associate Member status to members of the Royal Meteorological Society who wish to join CMOS. Last year we approved a similar arrangement with members of the Canadian Geophysical Union, with whom we are now planning a joint meeting at our 2007 Congress in St. John's. CMOS Council has also approved proposed amendments to our constitution and by-laws which will be distributed in advance for consideration at our Vancouver Congress Annual General Meeting. A nomination for CMOS Privacy Officer will also be presented for ratification at that meeting. Our CMOS External Relations Committee continues to argue for increased funding for federal science departments, which we consider to be essential for the well being and effectiveness of our respective disciplines.

The Call for Papers for the 39th CMOS Annual Congress, May 31 – June 3, 2005 on the "**Sea to Sky**" theme was published in the previous issue of our *CMOS Bulletin SCMO* and in this issue on pages 29 and 30. It will soon be time to make travel plans for the coming year, and I urge you to give priority to participating in this Congress, which is important for the vitality of our science and financial health of our Society. Abstracts are to be submitted by 18 February, with pre-registration by 15 April. I look forward to seeing you there.

Harold Ritchie
CMOS President / Président SCMO

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Inside / En Bref

Articles

Report / Rapport

Our regular sections / Nos chroniques régulières

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

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Cover page: The picture is of developing CU+ and CB in the unstable airmass that covered southern and eastern Ontario during the period July 13-16, 2004. It was taken looking southwest from a site on the south shore of Lac DesChênes (Ottawa River) at the east end of Andrew Haydon park in Ottawa on July 16, 2004 at about 16:00 EDT. Photo is courtesy of George W. Robertson, Ottawa, Ontario.

Page couverture: L'image illustre le développement du CU+ et CB dans la masse d'air instable qui a couvert le sud et l'est de l'Ontario pendant le mois de juillet, du 13 au 16, 2004. La photo fut prise en regardant vers le sud-ouest d'un endroit situé sur la rive sud du lac DesChênes (sur la rivière des Outaouais) à la pointe est du parc Andrew Haydon à Ottawa, le 16 juillet 2004 vers les 16:00 heures HNE. La photographie est une gracieuseté de George W Robertson, Ottawa, Ontario.

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CMOS exists for the advancement of meteorology and oceanography in Canada

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

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

Executive / Exécutif

Global Temperature in 2004 Fourth Warmest*

Résumé: Selon l'OMM, la température moyenne à la surface du globe en 2004 devrait dépasser de 0,44° C la normale calculée pour la période 1961-1990 (14° C), d'après les relevés des Membres de l'Organisation météorologique mondiale (OMM). Par conséquent, 2004 se place au quatrième rang des années les plus chaudes depuis 1861, juste derrière 2003 (+0,49° C). 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 cette même période. À l'exception de 1996, les dix dernières années (1995-2004) font partie des décennies les plus chaudes jamais observées.

GENEVA, 15 December (WMO) — The global mean surface temperature in 2004 is expected to be +0.44° C above the 1961-1990 annual average (14° C), according to the records maintained by Members of the World Meteorological Organization (WMO). This value of 0.44° C places 2004 as the fourth warmest year in the temperature record since 1861 just behind 2003 (+0.49° C). However, 1998 remains the warmest year, when surface temperatures averaged +0.54° C above the same 30-year mean. The last 10 years (1995-2004), with the exception of 1996, are among the warmest 10 years on record.

Calculated separately for both hemispheres, surface temperatures in 2004 for the northern hemisphere (+0.60° C) are likely to be the fourth warmest and, for the southern hemisphere (+0.27° C), the fifth warmest in the instrumental record from 1861 to the present.

Globally, the land-surface air temperature anomaly for October 2004 was the warmest on record for a month of October. The blended land and sea-surface temperature (SST) value for the Arctic (north of 70° N) in July and the land-surface air temperature value for Africa south of the Equator in July were the warmest on record for July. Significant positive annual regional temperature anomalies, notably across much of the land masses of central Asia, China, Alaska and western parts of the United States, as well as across major portions of the North Atlantic Ocean, contributed to the high global mean surface temperature ranking.

Over the 20th century, the global surface temperature increased by more than 0.6° C. The rate of change for the period since 1976 is roughly three times that for the past 100 years as a whole. In the northern hemisphere, the 1990s were the warmest decade with an average of 0.38° C. The surface temperatures averaged over the recent five years (2000-2004) were, however, much higher (0.58° C).

Strong regional temperature differences

During June and July, heatwaves with near-record temperatures affected southern Spain, Portugal, and Romania, with maximum temperatures reaching 40° C. In Japan, extreme hot conditions persisted during the summer with record-breaking maximum temperatures. An exceptional heatwave affected much of eastern Australia during February, as maximum temperatures soared to 45° C in many areas. The spatial and temporal extent of the heatwave was greater than that of any other February heatwave on record. A prolonged severe heatwave across northern parts of India during the last week of March caused more than 100 fatalities.

In July, abnormally cold conditions in the high-altitude areas of the Andes in southern Peru reportedly killed 92 people. Cold weather since late December 2003 was blamed for as many as 600 deaths across South Asia. During January 2004, maximum and minimum temperatures were below normal by 6-10° across northern India and Bangladesh.

Prolonged drought in some regions

Drought conditions continued to affect parts of eastern South Africa, Mozambique, Lesotho and Swaziland in early 2004. However, enhanced precipitation in the last half of the rainy season provided some benefit to crops in southern Africa. The March-May rainy season was shorter and drier than normal across parts of the Greater Horn of Africa, resulting in a continuation of multi-season drought in this region. Isolated regions in the southern sector and portions of Uganda experienced driest conditions on record since 1961. In Kenya, a premature end to the 2004 long rains exacerbated the drought resulting from several years of poor rainfall in many areas. Food production in Kenya was projected at approximately 40% below normal. In spite of abundant rainfall in 2004, multi-year drought conditions also continued in Somalia, threatening agriculture and food security in the region. In Eritrea, which was struggling from nearly four years of drought, poor rains during the March-May rains exacerbated drinking-water shortages.

In India, the 2004 seasonal rainfall during the summer (south-west) monsoon season (June-September) over the country as a whole was 13% below normal with 18% of the country experiencing moderate drought conditions. In Pakistan, poor rains in July and August aggravated the long-term drought conditions, which had prevailed since the boreal spring. In Afghanistan, drought conditions that had plagued the country for the past four years continued in 2004 due to poor precipitation in the March-April season. In southern China, dry conditions persisted from August to October, resulting in the worst drought there in the last 54 years.

Long-term hydrological drought continued to affect much of southern and eastern Australia, as a result of rainfall deficits experienced since the major drought event of 2002/2003. Moderate-to-severe drought conditions continued in some areas of the western United States for the fifth year in a row. Some relief was experienced during September and October, though long-term drought remains entrenched across much of the region. Due to above-normal summer temperatures and dry conditions, a record area was burned by wildfires in Alaska.

Abundant rainfall and flooding in many other regions

Precipitation in 2004 was above average for the globe and 2004 was the wettest year since 2000. Wetter-than-average conditions prevailed in the southern and eastern United States, eastern Europe and parts of western Asia, Bangladesh, Japan and coastal Brazil.

The Asian summer monsoon during June-September brought heavy rain and flooding to parts of northern India, Nepal and Bangladesh, leaving millions stranded. Throughout India, Nepal and Bangladesh, some 1800 deaths were blamed on flooding brought by heavy monsoon rains. Flooding in north-east India (the states of Assam and Bihar in particular) and Bangladesh was the worst in over a decade. In eastern and southern China, heavy rains during June and July produced severe flooding and landslides that affected more than 100 million people and were blamed for more than 1000 deaths nationwide. Heavy monsoon rainfall during July and August produced flooding along several rivers in north-eastern and central Thailand. A significant low-pressure system brought record-breaking snowfalls in the Republic of Korea on 5 March, resulting in damage to agriculture worth more than US$ 500 million. In October, two typhoons and active frontal systems brought record-breaking heavy rainfall to Japan. Tokyo received a total amount of 780 mm precipitation in October, which is the largest monthly amount on record since 1876.

Mudslides and floods due to heavy rains across areas of Brazil during January and early February left tens of thousands of people homeless and resulted in 161 deaths. In January, Peru and Bolivia also experienced hailstorms, heavy rainfall and flooding, which killed at least 50 people.

In Haiti, torrential rainfall due to the passage of Hurricane ***Jeanne*** produced disastrous flooding that claimed some 3000 lives. This disaster came in the wake of flooding and landslides that affected Haiti and the Dominican Republic in late May 2004, in which more than 2000 people were killed and several thousand others were affected.

In the second half of November and beginning of December, three tropical storms and a tropical depression passed over southern and central parts of the Philippines, drenching the islands with several days of torrential rainfall and triggering catastrophic flash floods and landslides, which killed, according to reports, more than 1100 people.

Heavy rains from mid-January to March in areas of Angola produced flooding along the river system, which flows into neighbouring Zambia, Botswana and Namibia. Extensive flooding along the Zambezi River, the worst flooding since 1958, threatened more than 20,000 people in north-eastern Namibia and caused extensive damage to crops.

In Australia, parts of Tasmania, Queensland and New South Wales received unusually heavy rainfall in mid-January, which produced flooding and damage. Parts of the Northern Territory received the wettest rainy season on record. A series of strong storms during February produced heavy rainfall and damaging floods in southern parts of New Zealand's North Island.

Development of weak El Niño conditions

Sea-surface temperature and sea-level atmospheric pressure patterns in the tropical Pacific at the beginning of 2004 reflected near-neutral El Niño conditions. However, the increase and eastward expansion of anomalous warmth in the central and east-central equatorial Pacific during July-November indicated the early stages of a warm (El Niño) episode. By early November, positive equatorial SST anomalies greater than +1° C were observed from the central to eastern Pacific. SSTs in the far eastern tropical Pacific also warmed to slightly above-average levels. The Tahiti-Darwin Southern Oscillation Index has been negative since June 2003, but has fluctuated considerably. The tropical Pacific atmospheric conditions have continued to show only some weak characteristics of El Niño.

Above-average number of hurricanes and deadly typhoons

During the Atlantic hurricane season, 15 named tropical storms developed: the average is around ten. During August, eight tropical storms formed, which is a record for the most named storms for any month of August. Since 1995, there has been a marked increase in the annual number of tropical storms in the Atlantic Basin. Nine of the named storms were classified as hurricanes. Six of those were "major" hurricanes (category three or higher on the Saffir-Simpson scale). Hurricane ***Charley*** was the strongest and most destructive hurricane to strike the United States since ***Andrew*** in 1992. In all, nine named storms impacted the United States, causing extensive damage estimated at more than US$ 43 billion.

In the South Atlantic Ocean, sea-surface and atmospheric conditions do not favour the formation of hurricanes. During March 2004, however, the first documented hurricane since geostationary satellite records began in 1966 developed. Named ***Catarina***, it made landfall along the southern coast of Brazil (in the state of Santa Catarina) on 28 March 2004, causing great damage to property and some loss of life.

Conversely, in the eastern North Pacific, activity was slightly depressed. Only 12 named storms developed during the year, compared to the average of 16.4. Out of those 12 storms, six reached hurricane strength and three

reached "major" status. In the North-west Pacific, 27 named storms developed, which is close to the 1971-2000 average of 26.7. Nineteen of them reached typhoon intensity. Ten tropical cyclones made landfall in Japan (breaking the previous record of six), which were blamed for 209 fatalities and extensive damage to property.

Smaller Antarctic ozone hole

This year, the maximum size of the Antarctic Ozone hole (19.6 million km^2) was reached in late September. Except for the year 2002, when the ozone hole split into two in late September, the October ozone hole this year was the smallest observed in more than a decade. The ozone hole in 2004 dissipated earlier than usual, in mid-November.

Low Arctic sea-ice extent

Sea-ice extent in the Arctic remains well below the long-term average. In September 2004, it was about 13% less than the 1973-2003 average. Satellite information suggests a general decline in Arctic sea-ice extent of about 8% over the last two-and-half decades.

Information sources

This preliminary information for 2004 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 two different datasets. One is the combined dataset maintained by the Hadley Centre of the Met Office, UK, and the Climatic Research Unit, University of East Anglia, UK, and the other one is maintained by the USA Department of Commerce's National Oceanic and Atmospheric Administration (NOAA). Results from these two datasets are comparable: both indicate that 2004 is likely to be the fourth warmest year globally. More extensive, updated information will be made available in the annual WMO statement on the status of the Global Climate in 2004, to be published in early March 2005.

(*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 Center, National Environmental Satellite and Data Information Service and NOAA's National Weather Service. Other contributors are WMO Member countries: Argentina, Australia, France, Germany, India, Japan, Mauritius, New Zealand, Norway, Sweden, and the Drought Monitoring Centre in Nairobi).

Source: WMO Website http://www.wmo.ch on December 27, 2004. WMO Press Release # 718.

The World Meteorological Organization is the United Nations System authoritative voice on Weather, Climate and Water.

Asian Tsunami Disaster

by Robert L. Jones[1]

The April 2002 Bulletin (30-2, .54-55) printed my book review of a new publication called: ***Tsunami: The Underrated Hazard*** by Edward Bryant, Professor of Geosciences, University of Wollongong, Australia. In view of the 26 December 2004 extreme tsunami event in Southern Asia, I am certain that Prof. Bryant is now experiencing a level of interest from the world's science community beyond what he could have ever thought. Only a few short years ago, he wrote and published an exhaustive survey and study of the tsunami phenomenon.

After re-reading his book, it seems appropriate to add additional comments now. This article is not intended to pick and choose from Prof. Bryant's published material nor, with the one exception below, is it intended to plagiarize his work. Prof. Bryant had surveyed all the global tsunami events in recorded history and earlier by studying "tsunami signatures" of events that were unrecorded. The question in everyone's mind now is: how big, how severe, how much of a killer was the Asian event, when compared to past tsunami.

The best way to answer this question is to look at Prof. Bryant's table on page 21 of his book, titled: ***Largest Death Tolls from Tsunami in the Pacific Ocean Region over the Last 2000 Years.*** Before doing that, may I make two comments: first, I have exchanged e-mails with Prof. Bryant and he has given permission to reprint his data, with appropriate attribution; second, you will see that his table refers to the "Pacific Ocean Region". This area includes the 2004 event but Atlantic Ocean and Mediterranean Sea tsunami are not included. Prof. Bryant identified several tsunami in those areas but the numbers of lives lost were orders of magnitude smaller than the bigger Pacific events. He concluded that, because of plate tectonics, the Pacific area's fault lines, often called "rings of fire", had produced the most deadly tsunami.

---

[1] CMOS Webmaster, Ottawa, ON.

Table 1.5 Largest Death Tolls from Tsunami in the Pacific Ocean Region over the Last 2,000 Years

Date	Fatalities	Location
***	***	***
22 May 1782	50,000	Taiwan
22 August 1883	36,417	Krakatau, Indonesia
28 October 1707	30,000	Nankaido, Japan
15 June 1896	27,122	Sanriku, Japan
20 September 1498	26,000	Nankaido, Japan
13 August 1868	25,674	Arica, Chile
27 May 1293	23,024	Sagami Bay, Japan
4 February 1976	22,778	Guatemala
29 October 1746	18,000	Lima, Peru
21 January 1917	15,000	Bali, Indonesia
21 May 1792	14,524	Unzen, Ariake Sea, Japan
24 April 1771	13,486	Ryukyu Archipelago
22 November 1815	10,253	Bali, Indonesia
May 1765	10,000	Guanzhou, South China Sea
16 August 1976	8,000	Moro Gulf, Philippines

Source: National Geophysical Data Centre and World Data Centre A for Solid Earth Geophysics, 1998, and Intergovernmental Oceanographic Commission, 1999.

*** At the time of writing we can only estimate what fatality data should appear in the table shown above. A first cut might be:

26 December 2004 | 220,000 | Indian Ocean, NW of Sumatra

Regarding location, the event occurred in the boundary area between the "Pacific Ocean Region" and the Indian Ocean Region, but it is clear that Prof. Bryant has included Indonesian events in his survey.

In conclusion it is obvious, from looking at this small amount of data, that the recent Asian tsunami event is of major proportions, approaching Biblical. Populations along affected coastlines have increased dramatically since almost every event recorded in the above table so this must be considered as the most significant factor in the very high numbers of fatalities. It will take more work by Prof. Bryant and others to compare the physics of this event to others. A final note about some A.D. "Biblical-level" natural disasters already documented:

Date	Fatalities	Location / Event
1876 to 1879	9,000,000	China / Drought
1887	900,000	China,Yellow R. / Flood
1556	800,000	China, Shaanxi / Earthquake
1970	300,000 to 500,000	Bangladesh / Cyclone & Flood
1931	400,000	China,Yangtze R. / Flood
1737	300,000	India, Calcutta / Earthquake
1976	255,000	China, Tianjin / Earthquake
526	250,000	Syria, Antioch / Earthquake
1932	200,000	China, Nan-Shan / Earthquake
1920	200,000	China, Gansu / Earthquake
1923	143,000	Japan, Yokohama / Earthquake
1730	137,000	Japan, Hokkaido / Earthquake
1948	100,000	USSR / Earthquake
1755	100,000	Lisbon / Earthquake & Tsunami
1290	100,000	China, Chili / Earthquake

Sources: Ottawa Citizen, page A5, 30 December 2004; and various record books / almanacs (e.g. Guinness).

Finally, after this article is published, I will set up an email system to loan the Bryant book to interested members. Initially, preference will be given to those in the Ottawa Centre.

For others, hopefully the book can be found in local libraries or bookstores.

Note: ISBN # 0-521-77799-X, Hardcover US$75.

Top 10 Canadian Weather Stories for 2004

by David Phillips[1]

Canadians had plenty to "weather" in 2004 as Mother Nature either froze, buried, soaked, blew or frightened us at various times throughout the year. We endured flash floods, weather bombs, humongous snowfalls and killer frost. And we once again proved our mettle as a winter people by beating back brutal cold and three record snowfalls. So what weather caught us off guard in 2004? A couple of thunderstorms of the "once in 200 years" variety that showed us just how vulnerable we are to the growing incidences of wild weather extremes.

Edmonton played host to this year's number one weather story with a torrential rain and hail deluge that caused horrendous flooding. A few days later, elements of that same storm triggered a flash flood in Peterborough, Ontario. Both storms were estimated to be 200-year events with combined property damage costs exceeding $300 million. Unbelievably, no one died in the floods.

Other top weather stories included two record snowfalls in Nova Scotia - one that was a world's record of sorts; a summer in disguise over most of Canada; a nation-wide January cold snap with a -60° C wind chill; a record May snowfall on the Prairies that set the stage for a colder than ever spring/summer; and costly wildfires in British Columbia and Yukon sparked by frequent dry lightning and record warm and dry weather. Out on the farm, it was yet another year of weather woe including a devastating billion-dollar frost.

The news wasn't all bad though! In 2004, we were spared deadly tornadoes, devastating hurricanes, drought and plagues. Our air was cleaner, there were no summer blackouts and we experienced less weather-related personal injuries and fatalities. Best of all, there were fewer mosquitoes carrying West Nile virus. And many might not believe this, but it was another warm year for Canada (although not as warm as it has been over the past seven years).

From a regional perspective, it seems that one area of the country always gets more than its share of bad weather luck through the year. In the recent past, Alberta and Quebec have suffered that misfortune but now it looks like Nova Scotia's turn. The last two years have been especially punishing and painful for that province with a costly record rainstorm, Hurricane Juan, White Juan and the earliest winter blast ever.

As a country, the fallout from weather extremes appears to be having a much greater impact on us from both a societal and environmental point of view. Scientists can't say yet that the increased weather severity can be directly linked to a warmer world, but it would certainly be consistent with our expectations of climate change. That aside, even pre-climate change weather extremes would be catastrophic for modern societies because of our larger communities with more people, buildings and other targets for destruction. Today, more than 80% of Canadians live in cities with a population of over 10,000 people. To accommodate this growth, we have paved over land and built on wetlands creating impervious surfaces unable to absorb even ordinary rainfalls. With or without climate change, we are becoming more vulnerable to extreme weather. This past year provided clear examples in Canada that our urban infrastructure can't stand up to it. Our communities must become more resilient, not only for what lies ahead but for the climate we've already got.

Canada's Top Weather Stories for 2004 are rated from one to ten by considering factors such as the degree to which Canada and Canadians were impacted, the extent of the area affected, economic effects and longevity as a top news story:

Top Ten Weather Stories for 2004

1	**Storm Drowns and Pounds Edmonton**
2	**White Juan Buries Halifax**
3	**Summer's Cold Shoulder**
4	**Peterborough's Flood of Two Centuries**
5	**BC and Yukon - Warm, Dry and on Fire**
6	**January's Nation-wide Deep Freeze**
7	**A Billion Dollar Frost**
8	**Weather Picks on Nova Scotia Again**
9	**Snow Dump Smothers Prairie Spring**
10	**Weather Cures the West Nile Virus**

#1: Storm Drowns and Pounds Edmonton

During the first week of July, two slow-moving weather systems soaked Edmonton. That paved the way for a storm the next week that was to become the province's worst over-land flooding event in history. Rains on July 2 and 3 exceeded 50 mm in places, with most falling in just a short time. Four days later, another cold summer storm dropped

[1] Senior Climatologist, Meteorological Service of Canada, Downsview, Ontario, Canada

an equal amount of rain on an already sodden city. Then, in mid-afternoon on July 11, the atmosphere unleashed the biggest deluge and hailer ever seen in the Alberta capital. The storm, which began over southwestern British Columbia, intensified as it moved into central Alberta. It even spawned a couple of tornadoes north and east of the city. At its worst, the small but spectacular storm dumped more than 150 mm of rain in the southern and western parts of Edmonton in less than an hour (as detected by radar), likely making it the wettest moment in the city's history. With all that rain, flooding seemed inevitable but it was actually the golf ball-sized hail that clogged city storm sewer drains with ice, leaves and broken branches. Icy drifts lined city streets and turned backyards into snowbanks. Snowplows had to be called out to remove the piles of hail 6 cm deep.

Torrential rain and hail caused horrendous flooding in Edmonton in early July

The city's super-saturated clay soil and beleaguered sewer system could not take any more water. Mud and water poured down streets and through windows. The record flash flood, estimated to be a 1-in-200 year event, washed out roads, filled underpasses, and flooded basements to the rafters. Rising water made instant rivers out of streets and turned countless intersections into lakes as water lapped up to the door handles of many vehicles. The enormous water pressure blew hundreds of manhole covers sky high and pinned several trees to the ground.

Of special interest, the pounding storm ripped holes in the roof of the West Edmonton Mall's indoor amusement and ice rink, sending water cascading to the floor. For the first time in its history, officials evacuated the entire 800-store complex at Canada's largest shopping centre. Remarkably, there was no loss of life, yet there were countless close calls. Insurers paid out close to $160 million in over 12,000 claims. For the rest of the city, uninsurable damage to residences and small businesses, and infrastructure losses to roads and bridges were pegged at an additional $16 million. For many water-weary Edmontonians, it was the second or third time in less than 10 days they had to deal with nature's wrath.

 # 2: White Juan Buries Halifax

Forecasters called it an old-fashioned nor'easter but for most Maritimers it was Hurricane Juan in sheep's clothing. They dubbed it White Juan - a hurricane disguised as a blizzard. Late on February 17, an ordinary winter storm centred over Cape Hatteras, North Carolina suddenly intensified over the Gulf Stream before striking the Maritimes. Its central pressure, one mark of a storm's intensity, plunged 57 mb in 42 hours, making it one of the most explosive weather bombs ever - even more powerful than its namesake Hurricane Juan that struck the same area five months earlier. Huge, lumbering White Juan packed quite a weather wallop - heavy snows, fierce winds gusting to 124 km/h and zero visibility.

Snow fell at a phenomenal rate of five centimetres per hour for 12 straight hours. Blowing snow and high winds maintained blizzard conditions for a day or more and created monstrous drifts as tall as three metres. Halifax, Yarmouth and Charlottetown broke all-time 24-hour snowfall records, receiving almost a metre of snow. For Halifax, the 88.5 cm of snow on February 19 nearly doubled its previous record for a single day. More significantly, with over 300,000 people, it is now likely the largest city in the world to ever receive such a dump of snow in one day. Buffalo, Fargo and Boise move over! Halifax is the world's new snow king.

Almost at once, the southern Maritimes became a winter wasteland. For the first time in history, Nova Scotia and Prince Edward Island declared province-wide states of emergency lasting four days. Halifax issued a nightly nine-hour curfew over three days for all but essential workers in order to give them a fighting chance to clear the snow - estimated to weigh six million tonnes. When Toronto was hit with its "storm of the century" it called in the army, but hardy Maritimers organized neighbourhood work parties to dig themselves out. Streets were deserted for days. Huge drifts reduced four-lane boulevards to narrow walking paths. The Confederation Bridge was closed to all traffic for only the second time ever. The volume and density of the snow was so heavily packed that plows hit mounds of snow and literally bounced back. It took almost a week before bus and ferry service resumed and schools re-opened, leaving students with a record year for the number of days lost due to weather (up to ten in some districts). Miraculously, there were no serious injuries or deaths, just a million unforgettable stories.

#3: Summer's Cold Shoulder

Across much of Canada, the weather during the May long weekend - our unofficial start to summer - was "the pits". It rained often and a lot almost everywhere except the Yukon, which enjoyed a pleasant Victoria Day holiday. As it turned out, that weekend would set the tone for the season ahead: "The Summer that Never Was."

By Labour Day, Canadians from Calgary to Corner Brook were asking the same thing, "What happened to summer?" It was either too cool, too wet, or too cloudy during a May to October that seemed to bypass summer altogether. To make matters worse, Environment Canada had predicted yet another warm and dry summer. Rightly or wrongly, Canadians felt cheated. Enduring our long, dark winters makes most of us feel entitled to a decent summer, but no one ever said nature was fair. To remind us of what we were missing, Mother Nature did throw in the occasional stretch of good summer weather but nothing that lasted longer than three days. It may help to know that we were in good company, however. July was the coldest worldwide since 1992. That year's coolness was precipitated by the eruptions of the Philippine volcano Mount Pinatubo. For 2004, the culprit was a residual of cold Arctic air in the Canadian tundra - the third coldest spring in 57 years of records - that became a ready supply of cool air driven south by an upper air Arctic vortex that was stationary for much of the spring and summer over Hudson Bay. East of the Rockies, a persistent northwesterly flow effectively blocked any warm air streams penetrating from the south.

In actuality, it wasn't that it was so cold but rather that it wasn't very hot! Torrid days with maximum temperatures above 30° C generally numbered one or two at most. And the lack of sunshine gave the impression of much cooler temperatures. At times in June, places north of the Arctic Circle were warmer than those in southern Ontario. As it happened, the longest heat wave was in the Yukon. Whitehorse had eight consecutive days in June above 30° C, about all that Ottawa, Toronto and London could muster collectively all summer.

Summer plainly forgot residents of Manitoba and Saskatchewan. Across the West, it was the coldest May to August on record over the past 57 years. In fact, Winnipeg's summer was the coldest since probably the last ice age. With records dating back to 1872, May to August averaged 13.4° C in the Manitoba capital, almost a full degree colder than the previous record. The summer's worst moment might have been on August 18, when snow pellets fell in downtown Winnipeg and winds blew at 80 km/h. But, by then, most Winnipeggers had given up on summer anyway. Luckily, September turned out to be warmer than either June or August - a first for Winnipeg! Summer also was disappointing in the East. In Ottawa, the summer's warmest day was 30.7° C. That was on May 14! In Toronto, total sunshine between May and August was down by almost 200 hours and wet days outnumbered the dry.

Canadians were at first restless, then frustrated, and finally resigned that summer was missing in action. The frustration factor came from weather that was so inconsistent it was maddening. For the majority of cities, precipitation totals were down while the number of wet days was way up. Incredibly, the number of days when it was both sunny and wet on the same day was a record high - making them the rule rather than the exception. For example, between late May and mid-September, Montreal had 128 days with some sunshine but only five without sun, yet more than half of those "sunny" days were wet. If it wasn't raining, it was threatening.

The mixed bag of weather seemed to change often, even by Canadian standards, making it difficult to plan the day. Campers and beach bums stayed away in droves. People spent more time indoors and were generally less active. In urban areas, bars and eateries felt the heat of fewer sunny days that translated into less customers spending money. It was not a great year for air conditioners or swimsuit sales either. On the other hand, video rentals, movie theatres and tanning salons had many repeat customers. And while the weather was lousy for vacationers and day trippers, it was good for those with breathing difficulties who tend to suffer during smog and heat alerts. Gardens and lawns stayed lush and green and nobody had to turn on the sprinkler. For Christmas tree farms, it was one of the best growing seasons in years.

Did summer really pass us by this year? Not if you talk to residents on the far coasts. Pacific British Columbia enjoyed long bouts of sunny, mild and dry weather with record warmth and dryness for much of the summer. On the east coast, St. John's had one of the nicest summers in Canada - almost a degree warmer than normal - and half of its normal precipitation (the driest summer since 1967).

#4: Peterborough's Flood of Two Centuries

Following torrential rains early on July 15, a flood swamped Peterborough's downtown. Elements of the large weather system could be traced back to the storm that flooded Edmonton five days earlier. That storm worked its way slowly across the continent and locked in just east of Peterborough on July 14. Energized by cool air from the north and re-supplied by cargoes of moisture from the south, the storm unleashed an intense thunderstorm that continued for several hours.

Not surprising, official rainfall amounts were quite variable ranging from 100 mm at the airport to 240 mm at Trent University. Much of the rain fell in less than five hours in the early morning, forcing many residents out of bed and into the street. Bucket surveys using exposed plastic pails, garbage cans and other previously empty vessels revealed rainfall totals exceeding 235 mm in many neighbourhoods - more than a summer's worth of rain. And it didn't stop! Rain fell for the next five days. Observers at the Trent University weather station recorded a whopping 409 mm of rain in July, smashing the total precipitation for any month of the year.

The volume of water proved too much for Peterborough's drains and sewers, some of them built a century ago. However, few cities in North America could have handled the phenomenal 14 billion litres of water that splashed on Peterborough in under five hours. That's enough water to flow over Niagara Falls in about 40 minutes or to fill almost nine SkyDomes. It was one of the wettest days ever in

Canada east of the Rocky Mountains and likely the wettest day ever in Ontario, estimated to be a one-in-200-year event. At the height of the Peterborough storm, water in the city's wastewater system was five times the average capacity. With backed up storm sewers, much of the downtown core and a third of the city proper became a virtual waterworld under a metre or more of murky water. The Mayor declared a state of emergency that stayed in effect for 15 days. Hundreds of residents fled to shelters when roofs collapsed or water filled basements to waist-deep. Muddy waters turned streets into rivers, closed businesses and left cars floating. Power and telephone outages lasted for days and the clean-up took weeks to months. Some roadways and sidewalks had to be completely rebuilt.

An early estimate of insured losses exceeded $88 million. In addition, the Province of Ontario provided $25 million for emergency repair and restoration costs for city infrastructure. Consultants recommended that Peterborough spend upwards of $30 million for possible storm water and sanitary sewer system improvements over the next five years. For those who endured personal losses such as rare books, picture albums and other family keepsakes, however, there was no way to fix a price for what was gone and could not be replaced.

#5: BC and Yukon - Warm, Dry and on Fire

Never had the forests of British Columbia been so dry so early in the year. A persistent high pressure system, anchored near the Pacific coast for most of April through July, encouraged a southerly flow with clear skies and record warm temperatures that blocked storms from reaching the coast. Records for that time period over the last 57 years showed it had never been drier and only once warmer than in 2004. Precipitation amounts were nearly half of normal and temperatures were more than two degrees warmer than normal. Even more telling, five of the last six years have been drier than normal with the last three being the driest on record across British Columbia. Victoria boasted the second warmest and driest April on record. Alarmingly, it was also the second driest December-to-April period on record, and it just got warmer, drier and sunnier in May, June and July. Osoyoos was the nation's hot spot in 2004, a scorching 40.5° C on June 21.

All indicators were lined up for the province to burn. With negligible moisture in the air and ground, and lots of extreme heat and dry lightning, the woods of British Columbia became a tinderbox. Wildfire managers feared a repeat of last year's fire season - the most expensive forest inferno on record. The drought code that the provincial forest service uses for determining soil moisture content registered 476 last year, which is dry. This year, the code reading was bone dry at 667. High lightning activity day after day soon overwhelmed firefighters, resulting in escaped fires that required them to seek assistance from across Canada and the United States.

The conditions spawned multiple starts and large fires with extreme behaviour, resulting in galloping fires requiring constant attention. One of BC's biggest fires was the Town Creek fire near Lillooet. Steep inaccessible terrain made battling the fire on the ground difficult. Nearly 5,000 residents were under a one-hour evacuation alert. Another huge fire in Lonesome Lake started in June but exploded in mid-July when whipped by strong winds. The fire destroyed several historic native grounds, including aboriginal graves and cultural sites within Tweedsmuir Park. Its massive plume of smoke and ash clouded the skies over Vancouver Island - some 400 km away - and hung over Vancouver and the Fraser Valley, discolouring the sun and casting a hazy hue over the region.

As it turned out, the number of wildfires in 2004 totaled 2,311 burning 227,339 hectares of BC forests. Unlike the wildfires of 2003, residential and business properties were spared for the most part, keeping costs much lower than last year's wildfires ($100 million compared to $325 million for 2003). The number of forced evacuations was also much lower, numbering in the hundreds this year versus 50,000 the year before. In addition, the 2003 fire season worsened as the summer wore on; this year it started much earlier but lessened in August.

Aside from forestry, the excessive warmth and prolonged dryness impacted ranchers in the interior who had to truck water because creeks, springs and reservoirs had gone dry. Dairy farmers irrigated their fields earlier than normal. And the massive kill-off of sockeye salmon in the northwest Pacific was partly blamed on the 60-year high temperatures of the Fraser River - approximately 22° C in 2004. The prolonged heat and dryness also hurt sport fishing, recreation and landscape touring. At times this summer, smoking was banned in Stanley Park, cooking in picnic areas stopped and hiking trails on the North Shore mountain closed.

Fortunately, timely rains and cool temperatures from August through November saved British Columbia from a second disastrous forest fire season and brought much needed moisture for what had become a water-starved province. Rainfall in Victoria and Vancouver totaled more than 40% above normal, with Vancouver experiencing its third wettest such period in 68 years of observations.

The Yukon was also a tinderbox with dry conditions and a record warm May to August, tying 1989 as the warmest such period on the books. Wildfires numbered more than double the territory's average - a record at 273 - but only accounted for 4% of the wildfire starts reported in Canada this year, even though the area burned amounted to more than 60% of the national total. The total charred area in Yukon was over 18,000 square km or three times the size of Prince Edward Island. Conditions were set by June when the fire danger rating in the Yukon took off following the longest heat wave ever recorded. Lightning started fires somewhere in the territory almost every day in early summer and officials had to ban all outdoor burning. At one

time in late June, smoke darkened the skies in the afternoon prompting the use of streetlights and vehicle headlights. People with respiratory problems and allergies were advised to stay indoors. Thick smoke created such poor visibility that pilots couldn't land in Dawson City. By the end of July, cooler temperatures and ample precipitation quieted the wildfire situation considerably.

#6: January's Nation-wide Deep Freeze

Years to come, the 2003-4 winter from December to February might be thought of as an easy one. Nationally, it was the sixteenth warmest winter in over half a century, some 1.5° C warmer than normal. Across the south, total seasonal snowfall was about three quarters of the usual accumulation. What the numbers don't tell is how a five-week pocket in the middle of the December through February time period hit us with bone chilling, teeth chattering, brutal cold that left most Canadians begging for spring.

Across central Canada, the year got off to a promising start with temperatures on January 3 at an unseasonably balmy 12.3° C. There were more golfers than skiers in southern Ontario. Others enjoyed in-line skating, outdoor basketball games, licking ice cream cones and drinking beer on front steps. That was to be the last mild day until February. The sudden onset of winter and the massive, deep cold shocked most Canadians. By the end of the first week of January, one super-sized, super-charged Arctic air mass filled the entire country at once, something you don't often see. At times in January, it looked like the entire country was being punished by every conceivable type of severe winter condition: raging blizzards, freezing rain, piles of snow, stinging ice pellets, numbing wind chill, black ice, flash freezes, and bouts of severe cold. The huge block of cold air was so thick and heavy that it filled every nook and cranny from coast to coast. Even across the normally balmy BC coast, dense, heavy cold air occupied valleys and coastal inlets dropping temperatures to -20° C in places. Vancouver dipped to -12.2° C with a wind that made it feel like -20° C, the coldest day there in seven years. By the end of the first week of January at least seven deaths across Canada were attributed to the cold.

On the Prairies, temperatures were brutal and wind chills unbearable. At Saskatoon, for example, the air temperature on January 28 dipped to -45° C, the coldest in 33 years. Add the wind and it felt more like -59° C. Exposed skin froze in less than 10 minutes. At times in January, even the planet Mars was warmer than Canada. The rover Spirit recorded a night-time minimum of -15° C on the Red Planet while in Key Lake, SK (some 570 km north of Saskatoon) it dipped to -52.6° C on January 29 making it the coldest place on Earth. Mercifully, there was no wind chill. By comparison, Vostok Antarctica (reputed to be the coldest place on Earth) was a balmy -28° C. In Eastern Canada, most cities recorded minimum temperatures in January no higher than the mid -20s. Add in a blustery wind and it felt closer to -40° C. While not the coldest temperatures ever recorded, both the duration of the cold and the chin-numbing wind chills made the deep freeze truly memorable. In mid-January, almost all of Quebec was engulfed in bone-rattling cold air producing some of the lowest temperatures of the winter. La Grande IV Airport saw -50.3° C on January 14 with worse wind chills. Sherbrooke had the coldest January ever at -17.9° C, some six degrees colder than normal.

Millions of Canadians struggled to stay warm as customers cranked up the thermostat to beat back the cold. The demand for energy soared across Canada with most provinces setting single-day records for peak and daily electricity consumption. The homeless crowded shelters. Hospitals were pushed to handle many more cases of frozen toes and ears. Vets reported cats' ears and noses were falling off. Farmers struggled to save newborn livestock. School "snow days" became a regular happening everywhere, either because of too much snow, brutal wind chills or frozen water pipes. Concerts, bingos, hockey games and other events were postponed then cancelled. Homeowners flooded city hot lines complaining about burst water pipes and frozen toilets, and motorists kept auto clubs hopping with calls for repeated boosts during the worst of the cold snap. It was so cold that even ink in ballpoint pens froze.

Some good news? Crime - especially car theft - was way down, video rentals way up and cabbies weren't complaining about the extra fares. Because it was too cold to skate or ski, travel agents compiled record bookings to anywhere as long as it was warm.

#7: A Billion Dollar Frost

At the beginning of the growing season, much of the West was facing yet another year of drought. Fourteen of the past eighteen seasons, dating back to the fall of 1999, had been drier than normal and this spring's soil moisture capacity was less than 50% of normal across Saskatchewan, Alberta and southwestern Manitoba. By mid-August, though, farmers were gleeful. Fields were green and healthy. A wet and cool beginning to the growing season ended any chance of drought and staved off a predicted plague of grasshoppers. Add in some real July warmth without the heat stress and it was looking like the best crop in years.

Of course, until the crop is in the bin you can never be too sure. This growing season, about the only thing that could prevent a bumper crop would be an untimely frost - a real threat considering that an unusually cold and snowy start to the season had curtailed planting and significantly delayed crop growth. By August 15, farmers still needed another five to six weeks of frost-free weather to ripen the crops. Considering the normal first frost in the southern Prairies averages between September 15 and 20, farmers were cautiously optimistic.

Sadly, disaster came early on August 20 when a widespread killing frost struck parts of south and central Saskatchewan and Manitoba, making it one of the earliest major frosts in 50 years. The combination of cold air, light winds and clear skies - the deadly three ingredients for hoar frost - were just right for a white sheath to coat rooftops, windshields and lush fields. Low temperature records spanning over 100 years were broken at, among others, Saskatoon, Winnipeg and Yorkton. Broadview was the coldest spot at -2.9° C. The duration of frost and the immaturity of the grain made the crop especially vulnerable. "What a year," said one farm expert. "Frost has appeared each and every month somewhere in the southern Prairies."

From there it only got worse. Desperate for warmth and sunshine, farmers instead faced hard driving rains, dew, fog, hail and snow, cloud and cold, and more killing frosts. In Winnipeg, the average total rainfall in August and September totalled 214 mm - about 68% more than normal. Rain-sodden crops rotted in the fields. Machinery became bogged down in mud. Across the eastern Prairies, the harvest was only 10% complete by mid-September, compared to a usual average of 50%. Poor weather meant damage to the quality of wheat and barley crops from mildew, sprouting and bleaching. A leading farmer-directed agri-business said that poor end-of-summer weather might have cost Canada's grain industry close to $2 billion in lost revenues. Certainly, the harvest was one of the poorest qualities on record. For example, 60% of Saskatchewan wheat typically comes off the field rated at Number 1 for quality. In 2004, however, only 6% achieved that grade. What crops were harvested contained a high moisture content necessitating costly artificial drying.

The only bright spot to the fall harvest this year was an exceptionally mild and dry end to the season with only scattered light precipitation into November. Grateful farmers went flat out in order to finish the harvest, reaching about 98% completion before the arrival of colder temperatures at November's end.

#8: Weather Picks on Nova Scotia Again

Just after Remembrance Day, Nova Scotia was hit by a surprise first blast of winter with a thick blanket of wet, slushy snow that many residents would just as soon forget. For some it turned out to be a bigger blow than White Juan nine months earlier. The large storm deepened off New England, then tracked south of Nova Scotia where it stalled for two days before moving on to Newfoundland. Because temperatures hovered near zero, a fine line separated rain and snow. Areas such as the Northumberland Strait coast and along the Atlantic Coast of Nova Scotia reported mostly rain. Inland, the snow was heavy at times with an occasional mix of rain and ice pellets.

The following snowfall record totals were logged over the two-day storm

Accumulated snowfall in cm	Nov 13	Nov 14	Total
Halifax International A.	24.8	13.0	37.8
Shearwater Airport	35.2	15.2	50.4
Greenwood	27.6	5.4	33.0
Yarmouth	53.4	8.6	62.0

The storm was interesting in many ways. For example, it was the heaviest dump of snow on record so early in the season. At Shearwater, there have been six huge two-day snowfalls with snow accumulations of over 50 cm in the past 60 years. Two of those six occurred in 2004. And never has a 50+cm snowfall over two days occurred before February 2-3 until this year. For a single-day snowfall accumulation over 35 cm, there have been 14 such events, but, again, none as early as November 13. Yarmouth had a whopping 53.4 cm in one day - only the second time that station has ever recorded a snowfall above 50 cm. The last time was on March 10, 1964 when 50.8 cm of snow fell.

Of more significance was the character of the snow and accompanying winds. The heavy snow was especially wet and sticky, with probably twice the adhesion of the snow from White Juan. Adding in rain, light freezing drizzle and ice pellets, along with close air and dew-point temperatures, created weighty snow accretion on wires and towers of 10 to 15 cm thickness. But that's not all! Push those thick sheaths of snow with strong gusty winds at 75 km/h and you get an enormous stress load on trees, power lines, and transmission towers. The result produced a failure of 15 towers and thousands of kilometres of cable and wire across Nova Scotia. With substantial damage to the province's power grid, 110,000 customers lost power. By comparison, Hurricane Juan took down only three main transmission towers. Further, this time it was much more difficult to assess and repair the damage.

The November storm hit hardest in the Annapolis Valley, the Halifax region and northeastern Nova Scotia between Truro and the Canso Causeway. Residents in the country were left in the dark without running water and telephone service for the better part of a week. Nova Scotia Power felt the heat from customers who had to endure the third major power outage in just over a year. By mid-day on November 14, the provincial power grid was in the worse shape it had ever been in. The utility received more than 250,000 calls in just 12 hours. Two hundred emergency crews, including 55 from New Brunswick and Maine, worked around the clock to restore power.

The storm also darkened Halifax International Airport where at least 48 flights were suspended. On the roads, traffic was surprisingly heavy as people who would otherwise stay home headed out in search of friends and relatives with heat and light. Some communities declared

states of emergency, closed businesses and schools, and created comfort centres.

With power restored, Nova Scotians began asking what they had done to deserve such wrath from Mother Nature. From the worst rainstorm in Atlantic Canada's history, one of our country's most destructive hurricanes, a world record snowfall and another snow storm of the century, the weather had certainly been punishing to the province over the last two years.

#9: Snow Dump Smothers Prairie Spring

For Westerners, 2004 was a reminder that spring might just be the cruelest season of all. On May 11, a wicked Colorado storm swept across the West dumping mounds of wet snow from Calgary to Kenora. Farmers welcomed the white moisture, as the growing season was about to get underway. But, for winter-weary city folk, especially golfers and gardeners, it was like having to live with winter all over again.

The storm featured a medley of precipitation: ice pellets, patchy freezing rain, rain, snow, and some thunder and lightning for good measure. Among the top snowfalls over two days were: Alberta's Mountain View at 48 cm and Cardston at 32 cm; Saskatchewan's Rock Glen at 45 cm, Midale at 33 cm and Estevan at 23 cm; and Manitoba's Neepawa at 40 cm, Portage at 30 cm and Brandon at 29 cm. In Winnipeg, the 31 cm of snow over two days was a record for May. In other areas, the storm dumped a load of rain. Sprague, MB, for example, got 97 mm of the wet stuff.

Travel became a nightmare. Snowploughs were brought out of storage to clear blocked city streets. Most just rode up on top of the snow piles, unable to clear the slush turned cement. The long line-ups of deserted cars and trucks on the Trans-Canada Highway had the effect of crippling road transportation coast to coast. Delays of 500 to 600 trucks in a single stretch of highway for the better part of 48 hours cost the transportation sector in Canada millions of dollars. In southern Manitoba, it was the latest ever closure of the Trans-Canada Highway due to winter conditions. At the Winnipeg International Airport, cancelled flights due to snow had never been logged that late in the spring. The weight of the wet snow knocked down hydro poles from Alberta to Ontario, leaving several thousand homes and businesses without power. School buses in rural areas did not run for at least two days. Businesses couldn't remember a worse beginning to the pre-summer season. For market gardeners, it was the latest start in more than 20 years.

In northwestern Ontario, the storm dumped huge amounts of both rain and snow, forcing highways and schools to close. For Kenora, Dryden and Sioux Lookout it dropped close to 40 cm of snow followed by 40 mm of rain. The heavy snow and ice pellets toppled trees over hydro lines, knocking out power to almost 5,000 customers from Kenora to Nakina.

An indirect impact of the spring whitewasher was that it probably helped to ensure a record cold May and then some. Many Prairie cities had their coldest May to August on record. Beginning with this huge dump of snow, westerners can't be faulted for believing that they somehow missed spring completely and that summer lasted maybe a day or two at most.

#10: Weather Cures the West Nile Virus

The bummer of a summer wasn't all bad: clean air, significant energy savings and fewer mosquitoes were a few of the benefits Canadians enjoyed. Predictions of 2004 as the "Year of the Mosquito" - in particular, the one carrying West Nile virus - fell flat. The Culex taralis mosquito thrives in hot and dry weather. Summer 2003, with its excessive warmth and high humidity, saw 1,400 Canadians in seven provinces sickened with the West Nile virus and 14 deaths. The number of infected dead birds nationwide exceeded 1,630. But for 2004, May to August was the second coolest such period in 27 years across Canada. Mosquitoes hate cool temperatures, especially in early summer when their favourite victims - migrating birds - are in abundance. In cooler weather, mosquitoes become less active and don't breed as often. Further, the inclement weather meant fewer people spent much time outdoors. When we did venture out, pants and long sleeves were the norm (especially in the evenings) helping make everyone less of a target. Instead of the feared epidemic, the West Nile virus all but disappeared as a threat in 2004. In total, 400 virus-positive dead birds were found in four provinces, leading to just 29 clinical cases of West Nile virus and no deaths.

Although it was an important factor, the weather can't take all the credit for sidelining West Nile. Other considerations, like greater community and individual preventative programs and greater resistance to the virus itself were also at play. Through years of exposure, a higher proportion of humans and birds likely carry antibodies to the virus, and have, therefore, built up an immunity to the disease.

Source: Meteorological Service of Canada - Environment Canada - Government of Canada, The Green Lane™ Website, 29 December 2004.

More reading on Tsunamis

People who wish to learn more on tsunamis may choose to read the following book: Murty, T.S., *Seismic Sea Waves, Tsunamis*, 1977, Department of Fisheries and the Environment, Bulletin # 198, Ottawa, ISBN # 0-660-00565-4, Canada, $10.00.

Warning System will better prepare Canadians for Severe Weather

Pelmorex (a CMOS member) awaits CRTC approval

by Paul Temple[1] and Anthony J. Chir[2]

Many Canadians understand that talking about the weather is not a nicety of conversation, but a necessity to protect themselves and their property. That's because severe weather disturbances pose significant threats to their lives and livelihoods.

For instance, tornadoes cause, on average, two deaths, twenty injuries and tens of millions of dollars in property damage per year in Canada. Worse still are winter storms and excessive cold. These occurrences claim more than 100 lives every year in Canada.

These are not unique or unusual incidents. In any given year, Environment Canada issues more than 14,000 severe weather warnings.

However, Canadians must protect themselves from other environmental forces. Natural disasters, such as floods, are notoriously destructive in terms of property damage. For instance, the infamous 1996 Saguenay floods in Québec resulted in $1.5 billion in economic losses.

While Saguenay and the 1997 Red River flood in Manitoba, which caused $500,000 million in damages, are extreme cases, every province and territory have been affected by serious floods. This is one reason why The Institute for Catastrophic Loss Reduction estimates the annual cost of natural disasters to Canadian taxpayers and insurers doubles every five to ten years.

Despite these and other documented facts, Canada remains ill-equipped to minimize such risks.

The Senate Standing Committee on National Security and Defence noted last December that the "provinces and territories have difficulty disseminating emergency-related information to citizens." It went on to recommend the establishment of emergency public warning systems for all provinces and territories, one that could interrupt radio and television broadcasts during emergencies.

There is a strong case for such a system. Experts note that a quick response to severe weather makes all the difference when it comes to saving lives and property. For example, the Bangladesh cyclone in May 1994 killed 200 people compared with over 130,000 due to a similar cyclone in 1991. A government of Bangladesh spokesman attributed this achievement principally to improvements in warning systems and evacuation.

The Senate recommendation may be addressed if a recent proposal by Pelmorex Communications, the owner of *The Weather Network / MétéoMédia* specialty channels, is approved by the CRTC.

The broadcaster, a member of CMOS, wants to establish a national emergency alert service that will enable Canadians to take necessary action in the event of such emergencies. The aim is to ensure citizens are better prepared to ensure their safety and minimize damage to their property.

Pelmorex and Environment Canada invested 10 years of collaboration efforts to find an end-to-end solution that would address all cable subscribers. Pelmorex developed the necessary technology to link with the cable systems and Environment Canada provided the weather warnings. The system was extensively field tested and refined.

Specifically, the All Channel Alert service (ACA) will enable authorized federal government agencies or applicable provincial or municipal authorities to alert Canadian cable or satellite subscribers, in both official languages, to imminent threats to life or property caused by severe weather disturbances, natural disasters or other local emergencies. An audio alert will address the needs of the visually impaired.

The CRTC will be asking for the public to comment on the service. The public can learn more information on ACA and its CRTC application by clicking on www.allchannelalert.com.

The proposed system would overlay a message on all television channels distributed by cable and satellite providers in a geographic area affected by an impending emergency, regardless of what channel viewers may be watching. ACA will simultaneously alert local radio and television newsrooms, and provide an audio alert for the visually impaired.

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[1] Pelmorex, Mississauga, ON.

[2] Environment Canada, Downsview, ON.

ACA was endorsed by leading advocates of emergency preparedness, such as Canadian Meteorological and Oceanographic Society as well as all levels of government – including Environment Canada, industry, and NGOs involved in emergency warning, mitigation, response and relief efforts. Experts believe a quick response to severe weather makes all the difference when it comes to saving lives and property.

For more information visit www.allchannelalert.com

Furthermore, this system -- which Pelmorex describes as a "first line of defence" -- would be welcomed by a majority of Canadians. Almost 80 percent of Canadians (78%) consider the concept of emergency warning messages displayed on all channels during regular programming to be either an excellent idea or a good idea according to a survey conducted by Maritz Thompson Lightstone on behalf of Pelmorex.

Clearly, the time has come for a national emergency broadcast system for severe weather warnings.

U.S. Announces Plan for an Improved Tsunami Detection and Warning System

Jan 14, 2005 — Plans were announced today to expand the U.S. tsunami detection and warning capabilities as a contribution of the Global Earth Observation System of Systems, or GEOSS — the international effort to develop a comprehensive, sustained and integrated Earth observation system. The plan commits a total of $37.5 million over the next two years.

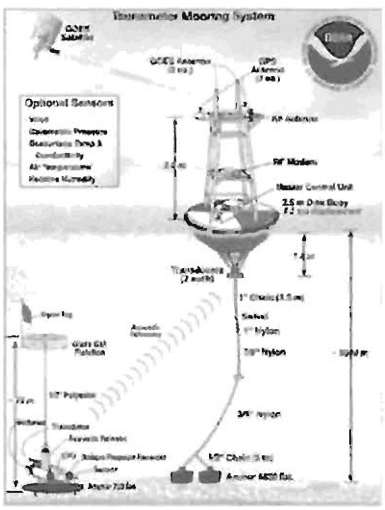
"President Bush is committed to ensuring the safety and protection of U.S. lives and property through a system of monitoring and emergency response that will mitigate the effects of natural disasters, including earthquakes and tsunamis," said John H. Marburger III, Science Advisor to the President and director, Office of Science and Technology Policy. "This plan will enable enhanced monitoring, detection, warning and communications that will protect lives and property in the U.S. and a significant part of the world. Working through GEOSS and other international partners, the U.S. will continue to provide leadership in planning and implementing a global observation system and a global tsunami warning system, which will ultimately include the Indian Ocean," Marburger said.

With this new investment, NOAA will deploy 32 new advanced technology Deep-ocean Assessment and Reporting of Tsunami, or DART, buoys for a fully operational tsunami warning system by mid-2007. In addition, the United States Geological Survey will enhance its seismic monitoring and information delivery from the Global Seismic Network, a partnership with the National Science Foundation.

The new system will provide the United States with nearly 100% detection capability for a U.S. coastal tsunami, allowing response within minutes. The new system will also expand monitoring capabilities throughout the entire Pacific and Caribbean basins, providing tsunami warning for regions bordering half of the world's oceans.

Source: NOAA website on 17 January 2005.

The United States has led the GEOSS effort since 2003 when the G-8 called for establishing a global observation system. The United States launched the GEOSS process by hosting the first Earth Observation Summit in July 2003. GEOSS now has 54 participating nations, including India, Indonesia and Thailand. The GEOSS design for this new system is scheduled to be adopted at the Third Earth Observation Summit that will be held in Brussels this February.



Deep-ocean Assessment and Reporting of Tsunamis (DART) system. Picture courtesy of NOAA.

The United States developed a Strategic Plan for the U.S. Integrated Earth Observation System, which, like the GEOSS plan, focuses around nine societal benefit areas, including "Reduce loss of life and property from disasters" and "Protect and monitor our ocean resources." The U.S. strategic plan will serve as the U.S. component to the GEOSS implementation plan.

NOAA (an agency of the U.S. Department of Commerce) is dedicated to enhancing economic security and national safety through the prediction and research of weather and climate-related events and providing environmental stewardship of the nation's coastal and marine resources.

For more information, please contact: Scott Smullen, NOAA, (202) 482-6090; Delores Clark in Honolulu, Hawaii, (808) 532-6411; Jana Goldman, NOAA Research, in Silver Spring, Md, (301) 7132483; or Ann Thomason in Seattle, Wash., (206) 526-6800.

ANNONCE

La médaille Timothy R. Parsons

Le ministère des Pêches et des Océans (MPO) a créé un nouveau prix afin de souligner l'excellence dans le domaine des sciences de la mer au Canada. La médaille Timothy R. Parsons sera remise à des Canadiens qui se sont distingués dans un domaine multidisciplinaire lié aux sciences de la mer, afin de reconnaître l'ensemble de leur carrière et/ou une réalisation exceptionnelle récente.

La médaille a été nommée en l'honneur de Dr. Timothy Parsons, qui a mené une carrière extraordinaire en sciences de la mer, aussi bien au Canada qu'à l'étranger. Le Dr. Parsons est présentement 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.

Le Dr. Parsons se distingue par son souci de parvenir à une compréhension globale de l'écologie; il a entre autres contribué à la compréhension des liens qui existent entre les organismes pélagiques dans la chaîne alimentaire océanique. Il a contribué de manière importante au développement de l'océanographie biologique et il a élaboré plusieurs méthodes d'analyse en laboratoire qui sont couramment utilisées dans ce domaine. Le but qu'a toujours poursuivi M. Parsons était de mettre en œuvre une nouvelle méthode de gestion des pêches fondée sur l'évaluation des relations dynamiques entre les poissons et leur environnement physique, chimique et biologique.

Dans la plupart des pays du monde, la recherche en océanographie et la recherche sur les pêches sont financées séparément. Le Dr. Parsons s'est toujours préoccupé à assurer le lien étroit entre les sciences halieutiques et l'océanographie; il a démontré à maintes reprises comment l'environnement toujours changeant des océans influence les pêches. Le Dr. Parsons est également le fondateur de la revue *Fisheries Oceanography*.

Le Dr. Parsons a travaillé à la promotion d'une approche globale de l'évaluation des impacts des activités humaines sur l'environnement en s'appuyant sur son expérience en océanographie biologique. Il a entre autres contribué à l'étude des impacts de la construction du haut barrage d'Assouan et d'importants déversements de pétrole et a conseillé l'industrie à de nombreuses reprises. Le 27 avril 2001, le Dr. Parsons a reçu le 17e Japan Prize, remis par l'empereur du Japon.

Deux médailles Timothy R. Parsons seront décernées lors du prochain congrès de la Société canadienne de météorologie et d'océanographie (SCMO) à Vancouver en juin 2005. La première médaille sera présentée au Dr. Parsons et la deuxième médaille sera présentée au premier récipiendaire qui sera choisi au cours des prochains mois par le comité se sélection. La médaille sera par la suite remise à chaque année, à condition que le comité de sélection ait identifié un récipiendaire méritoire.

Mise en candidature

- La médaille Timothy R. Parsons :
  - peut être décernée à des résidents du Canada pour souligner des réalisations remarquables dans un domaine multidisciplinaire lié aux sciences de la mer;
  - est remise pour souligner la carrière extraordinaire ou une réalisation récente exceptionnelle. Les mises en candidature à titre posthume ne seront pas acceptées;
  - sera décernée seulement si, selon l'avis du Comité de sélection de la médaille Timothy R. Parsons, il existe un candidat méritoire.
- La mise en candidature doit être faite par un résident du Canada. Les lettres d'appui de la part de collègues seront acceptées mais elles ne sont pas nécessaires.
- Les mises en candidatures doivent être reçues au plus tard le 28 février 2005.
- 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. 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.
- Il convient d'adresser toute communication à :

  Comité de la médaille Timothy R. Parsons
  Ghislaine Laporte, Adjointe Exécutive
  Bureau de la SMA, Science
  Ministère des Pêches et des Océans
  Stn. 15E190 – 200 rue Kent
  Ottawa, Ontario, K1A 0E6
  Tél: (613) 990-5136; Télécopieur: (613) 990-5113
  LaporteG@dfo-mpo.gc.ca

ANNOUNCEMENT

The Timothy R. Parsons Medal

The Department of Fisheries and Oceans (DFO) has established an award to recognize excellence in Canadian ocean sciences. The Timothy R. Parsons medal will be awarded to residents of Canada for distinguished accomplishments in multidisciplinary facets of ocean sciences over their lifetime or for a recent outstanding achievement.

The award is being named in honour of Dr. Tim Parsons. Dr. Parsons has had a distinguished career in Canadian and international oceanography. Currently he is a Professor Emeritus at the University of British Columbia and an Honorary Research Scientist at the Institute of Ocean Sciences in Sidney, British Columbia. His lifetime work has been to establish a new ecosystem approach for the management of fisheries using oceanographic information.

Throughout his research career, Dr. Parsons has devoted himself to obtaining a holistic understanding of ecology, and in particular, understanding how pelagic organisms are interconnected in the oceanic food-web. He has made major contributions to the development of Biological Oceanography and is personally responsible for many of the standard analysis methods used in his field. Dr. Parsons' goal has been to present an alternative method for the management of fisheries based on the measurement of dynamic relationships between fish and their physical, chemical and biological environment.

In most countries of the world, oceanography and fisheries research are funded independently of each other. Dr. Parsons has always been a proponent of ensuring close links between fisheries science and oceanography and has repeatedly pointed out how the ever-changing environment of the oceans impacts fisheries. He was the founding editor of the journal "*Fisheries Oceanography*".

Dr. Parsons has also worked to encourage a holistic approach to the evaluation of human impacts on the environment using his experience in biological oceanography. As such, he has contributed to understanding the impacts of the construction of the Aswan High Dam, the impacts of large oil spills and has advised industry on countless occasions.

On April 27th, 2001, Dr Tim Parsons was the recipient of the 17th Japan Prize, awarded by the Emperor of Japan.

Two Timothy R. Parsons awards will be presented at the Canadian Meteorological and Oceanographic Society (CMOS) Congress in June 2005 in Vancouver. Dr. Timothy R. Parsons will receive the first award and the second award will go to the first recipient, who will be determined in the upcoming months by the selection committee. Awards will be presented in subsequent years provided the selection committee has identified a worthy recipient.

Nomination instructions

- The Timothy R. Parsons Medal is:
  - awarded to residents of Canada for distinguished accomplishments in multidisciplinary facets of ocean sciences;
  - awarded for excellence during the lifetime of the recipient or for a recent outstanding achievement, both being equally eligible. No posthumous nominations are considered;
  - awarded annually when, in the opinion of the Timothy R. Parsons Medal Committee, there is a meritorious candidate.
- Nominations for the award may be made by any resident of Canada. Letters of support from co-nominators are welcomed but are not necessary.
- The nominations should be received no later than February 28, 2005.
- 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.
- All communications should be addressed to:

Timothy R. Parsons Medal Committee
Ghislaine Laporte, Executive Assistant
Office of the ADM Science
Department of Fisheries and Oceans Canada
Stn. 15E190 – 200 Kent Street
Ottawa, Ontario, K1A 0E6
Tel: (613) 990-5136; FAX: (613) 990-5113
LaporteG@dfo-mpo.gc.ca

Building Capacity for Innovation

A Submission to the House of Commons Standing Committee on Finance 2004 Pre-Budget Consultation

Presented by the Partnership Group for Science and Engineering

Introduction

The Partnership Group for Science and Engineering (PAGSE) is a cooperative association of more than 20 national organizations in science and engineering, representing some 50,000 individuals from industry, academia and government sectors. It was formed in June 1995 at the invitation of the Academy of Science of the Royal Society of Canada. On behalf of its members, PAGSE addresses issues concerning the nature, importance and benefits of science and engineering to Canadians, and promotes greater understanding by decision-makers of the role of Science and Technology (S&T) in Canada's prosperity[1].

General Comments

The quality of life of Canadians is tied to our country's ability to compete in a global economy. Canada's capacity for innovation in S&T is essential to maintain and enhance that ability. In order to build its capacity for innovation, technology transfer and commercialization, and increase its market share, Canada must attract or train and retain a diverse and skilled workforce that will remain current with cutting-edge S&T developments and techniques.

PAGSE congratulates the Government for its constructive portfolio of new science agencies, programs and activities over the last few years. These include Canada Research Chairs, funding foundations (e.g. Canada Foundation for Innovation, Genome Canada, Canadian Foundation for Climate and Atmospheric Sciences, Sustainable Development Technology Foundation), Canada Graduate Scholarships; and federal contributions to Indirect Costs of research in our universities. PAGSE also commends the increased funding that has been provided to the Granting Agencies. In particular, we welcome the recent creation of the office of National Science Advisor (NSA) to the Prime Minister, and his immediate mandate, which includes evaluation of these government investments in S&T. The Advisor's input will assist the Government to position itself to address its stated national priorities regarding pressing social issues, the economy of the 21st century, and Canada's place in the world.

Canada's S&T capacity for innovation must be strengthened. Other governments (e.g. the UK, Asian countries, Australia) are substantially increasing their investment in national S&T capacity, while the US sees increasing international competition as a threat to its lead in innovation and to its market share. All are working to attract highly qualified personnel from abroad, and to retain their own skilled nationals. Canada must also act, now.

Building Capacity for Innovation

PAGSE considers the following to be important issues related to S&T capacity that merit consideration by the Government of Canada.

1. Support for the Office of the National Advisor

PAGSE congratulates the Government of Canada on the appointment of an independent National Science Advisor (NSA) to the Prime Minister. The NSA's task is imposing and expectations on him to lever Canadian S&T capacity are high. He will need access to robust assessments of scientific knowledge targeting key societal issues and sound foresight regarding the future impacts of S&T in Canada.

Recommendation:

- That the Government ensure adequate resourcing of the NSA's office to enable it to fulfill its mandate.

- That the Government follow through on its declared support for the creation and funding of a 'Canadian Academies of Science'. This institution would help mobilize Canada's capacity to provide independent scientific assessments, enhance the NSA's capacity, and provide an international voice for Canadian S&T.

2. S&T Research Capacity

Government science capacity

The National Science Advisor has been charged with identifying better ways to coordinate and integrate Canada's scientific assets across the innovation system. Science-based Departments and Agencies (SBDAs) and Research Support Agencies (RSAs) are vital components of the nation's capacity for innovation. In addition to monitoring and regulatory work, they conduct in-house process-oriented, thematic research to meet departmental mandates and government priorities. Moreover, they do so with a

[1] For example, in partnership with NSERC, PAGSE sponsors the *"Bacon and Eggheads"* breakfast lectures on Parliament Hill.

breadth of focus and a long-term perspective that is not common in other research sectors. PAGSE commends those SBDAs that have adopted the guidelines formulated by the Council of Scientific and Technical Advisors (CSTA) with respect to the selection and evaluation of S&T projects (BEST and STEPS reports). However, the perception of integrity of the selection/evaluation process, and of the quality of the science undertaken by SBDA's, would be strengthened by adopting a uniform set of open and transparent evaluation and selection procedures across all federal SBDAs. Furthermore, a horizontal approach to federal S&T should integrate aspects of complementary university- and industry-based research with government S&T programs in innovative and mutually advantageous partnerships[2].

Recommendation:

- That the Government of Canada establish a body under the National Science Advisor for strategic coordination of federal science, to prioritize the renewal of federal research infrastructure in order to improve federal S&T capacity, and to facilitate cross-sectoral research cooperation (government/external partnerships).

- That the Government establish government-wide standards for the transparent selection and evaluation of S&T projects in order to enhance the credibility of science undertaken by SBDAs.

Granting Agencies

PAGSE congratulates the Government of Canada on the investments it has made through the three granting agencies over the past several years: the Natural Sciences and Engineering Research Council (NSERC), the Canadian Institutes of Health Research (CIHR), and the Social Sciences and Humanities Research Council (SSHRC). At the same time, major challenges for S&T capacity-building remain. For example, there is enormous pressure on granting councils created by the large numbers of new applicants for research funding, including Canada Research Chairholders, as well as the requirement for appreciably higher levels of support, in order that Canada's current trailblazers and "leaders of tomorrow" can compete globally. Another critical area is a shortfall in funding to operate major facilities and infrastructure for which capital has been provided via the programs of the Canadian Foundation for Innovation.

Recommendation:

- To affirm its commitment to innovation, and thus retain and attract outstanding researchers to Canada, the Government should strengthen the capacity of the granting agencies to maintain a long-term perspective by accelerating the rate of increase of their funding allocations, and adopting a multi-year approach coupled with the option of a 10% carry-forward between years.

Capacity for research in remote areas

Canada's vast landmass and seas present daunting logistical and financial challenges for scientific research. PAGSE commends the Government for its renewed investment in the Polar Continental Shelf Project (PCSP), a new commitment to the International Polar Year in 2007-08 through government departments and agencies, and (through Networks of Centres of Excellence and NSERC) the ArcticNet consortium. However, the costs of access and daily maintenance, shipboard operations, and long-term field observatories are beyond the capabilities of these organizations.

In the past, federal SBDA's managed substantial facilities, permanent or otherwise, in remote regions of the country. Reductions in federal research platforms have left university-based scientists scrambling to assemble new *ad hoc* support to maintain vital facilities and to preserve knowledge that Canada needs now and in the future. By way of example, we point to the sudden closure of the Arctic Stratospheric Ozone Observatory on Ellesmere Island in 2002. In a recent report to Paul Martin by the former Chair of the Government Caucus on Post-Secondary Education and Research, science-based departments and agencies now constitute the weak link in Canada's S&T capacity. PCSP has rendered exceptional service to northern scientific research and stands as a model. However, a long-term, strategic vision is now needed, including local capacity building, to ensure that Canada's research and policy needs are met in remote areas across the country, and that Canada is able to take its rightful place in relevant international activities.

Recommendation:

- That the Government of Canada specifically mandate and fund SBDA operational support for scientific programs in remote areas, and create an inter-agency body to provide coordinated logistical support to the full spectrum of scientific research conducted in remote regions across Canada, particularly the Arctic. The resources must be able to provide sustained, integrated support over a wide range of geographic and disciplinary areas.

- That Canada's National Science Advisor be tasked with advising on how to structure the national inter-agency body to ensure sustained logistical support for effective research planning and operations to meet national needs.

3. Capacity for Commercialisation of S&T

The ability of industry to successfully move new inventions and ideas into the global marketplace depends on bridging

[2] e.g. Industry Canada, 2002. *Achieving Excellence - Investing in People, Knowledge and Opportunity*.

the gaps in the commercialization process. Canada has invested heavily in the research pipeline upon which new products and services are based. The government has also set ambitious goals for its innovation agenda. These goals include dramatically increasing the amount of research and development conducted by the private sector and increasing the amount of investment capital flowing into innovative companies. More recently, the government has provided funding for two pilot commercialization programs aimed at universities and federal laboratories.

These are all valuable contributions to Canada's quest to develop a knowledge-based economy that is competitive with the best in the world. But the competition is not merely watching from the sidelines. All advanced nations have developed or are developing aggressive innovation and commercialization strategies and programs. Now is the time for Canada to accelerate its efforts to realize these goals by establishing a progressive fiscal framework and creating programs that will allow companies to increase their capacity to bring their innovations to market and create new wealth.

Governments can assist smaller companies in their bid to commercialize products by becoming a first adopter of new products and services. They can also invest in proof of principle and demonstration projects. These steps will serve to increase capital required for commercialization by reducing the risk to venture capitalists and angel investors. The federal government also has a role in financing promising, innovative technology. Successive studies have demonstrated the need for more seed and pre-seed capital to stimulate company formation and growth, as well as incentives to enhance institutional investment in venture capital funds. Existing programs such as the National Research Council's Industrial Research Assistance Program, Technology Partnerships Canada and the climate change Technology Early Action Measures demonstration program already make valuable commercialization contributions in early stage technology development, SME support, and financing pre-seed demonstration of new technology. These programs should continue and should be strengthened, with specific emphasis on the receptor capacity of Canadian industry. The government should be commended for its additional $250M support in Budget 2004 to the Business Development Bank of Canada (BDC) for specific seed and venture capital initiatives. Further support in the pre-seed/seed program area is required, including the need to enhance skills development in SMEs. Such initiatives should be private sector/BDC led, and should be market driven, national in scope and directed to towards sectors in which Canada has significant potential for long-term economic benefit.

Recommendation:

- That the Government of Canada monitor new pre-seed and additional seed funding programs to ensure that they are market driven and led by the private sector. Such programs could be administered by the Business Development Bank of Canada.

- That the government strengthen existing programs such as Technology Partnerships Canada, Technology Early Action Measures, and the Industrial Research Assistance Program.

- That the government review the highly successful Scientific Research and Experimental Development tax credit program with the view to expanding its reach further downstream towards the marketplace.

4. Future Capacity in S&T

Young Scientists and Engineers

Given the increasing international competition for attracting and retaining highly qualified personnel, it is imperative that the Government of Canada continue to strongly encourage the post-graduate training of young Canadian scientists and engineers as part of its strategy to ensure the nation's S&T capacity in the immediate future. Many students graduate at the B.Sc. level with a significant debt load that discourages them from pursuing further training. Furthermore, small and medium enterprises (SMEs) need highly qualified personnel in order to build their capacity for innovation. Commonly, this involves graduate students and postdoctoral fellows.

Recommendation:

- That the Government examine potential mechanisms for debt forgiveness to encourage greater numbers of students to enter graduate school.

- As part of our recommendation regarding the strengthening of granting agencies, that the Government of Canada provide more substantial support through the granting agencies to cover both the stipends and the research and training costs of graduate students and post-doctoral fellows based in Canadian universities and colleges.
- That the Government ensure that post-graduate and post-doctoral academics working in SMEs be paid regular salaries.

Notes from Editor:

1) PAGSE
283 Sparks Street
Ottawa, ON K1R 7X9
Tel: (613) 991-6369.

2) Presented on September 7, 2004.

8th International Workshop on Wave Hindcasting and Forecasting held in the "Aloha" State

by Serge Desjardins[3]

In each job, there are some interesting parts and some less interesting ones. Last November, I was kind of forced by my managers to assist at a workshop that was being held quite far from Halifax. With no real enthusiasm, I accepted to be one of the representatives of Canada and of the Atlantic region to the 8th international workshop on wave hindcasting and forecasting. I made the 12-hour trip, and, upon arrival at my destination, I realized that I would be forced to spend my health break, lunch break and evenings under a tropical climate. I arrived a few days early, to recuperate from the jet lag and to acclimatize myself to this uneasy climate but there was still a surprise and torture that awaited all the participants to this workshop. The organizers of the meeting put us in a conference room with two large windows with a view of a very active ocean surrounding Oahu, one of the islands of Hawaii. To add to our difficulty in focusing on the presentations, some reckless wave surfers added some colour to this mostly blue/white moving painting. I have possibly lived the toughest week of my career and would like to thank my regional managers and the organizers of this workshop for that!
- .... Ok, now seriously!

This was my 5th participation in this international meeting regrouping wave experts - a workshop that I always find very intellectually motivating. Its format - a series of presentation followed by an hour of discussion at the end of the day - allows exchanges of ideas accompanied sometimes by some animated debate but, from my point of view, ends up with a better understanding of the waves. This workshop, which is held every two years, gathers together 50-60 scientists from across the continent and covers all aspects of the wave domain. The workshop treats wave climatology, hindcasting and forecasting from either an operational orientation or one of development, as well as wave modelling from the large scale to very fine scale, including where waves break near the coast or penetrate into bays and, finally, the fundamental understanding of wave physics.

For a meteorologist non-expert in waves, this workshop offers sessions with a lot of challenge in the understanding of the treated subject but the presence of meteorologists is important because we are the experts on the wind forcing of "wet" models (oceanic, waves, storm surge). This was, indeed, the purpose of my presentation at this workshop, to present a Canadian approach to allow the wet models to be run with a wind field with hurricane characteristics that our current operational atmospheric models still do not simulate perfectly. The methodology proposed was by blending a surface parametric hurricane wind field into the regional GEM surface wind forecast with the help of a coupled system.

During the luau banquet, an award was given to Val Swail, one of the main organizers of this workshop since its beginning, also a very important Canadian international figure in the wave community, and to whom the word "retirement" is part of his current vocabulary. In the same vein, the organizers of this workshop were seeking a relief team to organise the next workshop. I am pushing further the request by suggesting a relief team to represent Canada in the international wave community.

Finally, although this wave community agreed that more work has to be done in the physics of the models to forecast synoptically the waves as accurately as possible, much of the research presented dealt with challenges of shallow water and coastal wave forecasting. Realising that possibly more personal and financial resources are given to wave research in countries other than Canada, we still have the capability to develop an operational (24-hour/7-day with support) coastal wave program. The key to success is a strong collaboration between the government atmospheric and ocean experts, working sometimes in partnership with universities or the private sector. I hope that at the next meeting we will be able to announce such an operational program for Canada.

[3] Environmental modelling scientist
National Marine and Coastal Laboratory
MSC-Atlantic, Environment Canada
Halifax, NS

CMOS 2005 TOUR SPEAKER

Testing the Iron-DMS-Climate Connection in the Subarctic Pacific

Maurice Levasseur
Canada Research Chair
Université Laval

Dr. Maurice Levasseur

Episodes of elevated iron supply to the ocean over geological timescales resulting in enhanced algal productivity are hypothesized to alter global climate by increasing both sequestration of biogenic carbon to the deep ocean and cloud albedo via the formation of algal-derived sulfur aerosols. In support of this hypothesis, several mesoscale iron-enrichments conducted during the last 10 years in iron-limited oceanic regions have shown increased algal growth and uptake of atmospheric CO_2 in surface waters, and up to fivefold increases in the concentrations of dimethylsulfide (DMS), a biogenic gas that produces sulphur aerosols. In July 2002, we conducted a large scale iron fertilization experiment (Subarctic Ecosystem Response to Iron Enrichment Study - SERIES) in the Northeast Pacific as part of the Canadian SOLAS Program (Surface Ocean - Lower Atmosphere Study) in order to determine the influence of this limiting micronutrient on the dynamics of climate relevant gases. The addition of iron resulted in an important increase in phytoplankton biomass and a moderate increase in carbon sequestration. In contrast with previous experiments, the iron fertilization resulted in a significant decrease in DMS concentrations. The decrease in DMS levels coincided with an increase in bacterial production and sulfur demand and a marked shift in the bacterial metabolism of dimethylsulfoniopropionate (DMSP), the algal precursor of DMS. Iron-enrichment resulted thus in both a low efficiency of carbon export and a reduction in DMS concentrations, leading to conditions that would not mitigate greenhouse warming. Causes and consequences of this unexpected response will be discussed during this talk.

CONFÉRENCIER ITINÉRANT 2005 de la SCMO

Tester la relation fer-DMS-climat dans le Pacifique subarctique

Maurice Levasseur
Chaire de recherche du Canada
Université Laval

À l'échelle de temps géologique, les périodes où les apports en fer aux océans étaient élevés semblent avoir refroidit le climat global en favorisant la productivité algale, la séquestration du carbone biogénique et la production d'aérosols soufrés qui augmentent l'albedo des nuages. Pour supporter cette hypothèse, les expériences d'enrichissement en fer à grandes échelles menées au cours des derniers 10 ans dans les régions océaniques limitées en fer ont mis en évidence une augmentation de la croissance algale et de la prise de CO_2 par les eaux de surface, de même que des augmentations jusqu'à 5 fois des concentrations de diméthylsulfure (DMS), un gaz d'origine biologique produisant des aérosols sulfatés. En juillet 2002, une expérience d'enrichissement en fer à grande échelle a été réalisée dans le Pacifique nord-est (Subarctic Ecosystem Response to Iron Enrichment Study - SERIES) dans le cadre du programme Canadien SOLAS (Surface Ocean - Lower Atmosphere Study) afin de déterminer l'influence de ce micronutriment sur la production de gaz agissant sur le climat. L'addition de fer a résulté en une augmentation importante de la biomasse phytoplanctonique, mais modeste de la séquestration du carbone. Contrairement aux expériences précédentes, la fertilisation en fer a occasionné une diminution des concentrations de DMS. La diminution de DMS a coïncidé avec une augmentation de la production et de la demande en soufre des bactéries, de même qu'en un changement marqué dans le métabolisme bactérien du diméthylsulfoniopropionate (DMSP), le précurseur algal du DMS. L'enrichissement en fer a donc résulté en une faible efficacité d'exportation en profondeur du carbone biogénique et en une réduction des concentrations en DMS, conduisant à des conditions qui n'atténuent pas le réchauffement lié à l'effet de serre. Les causes et conséquences des ces résultats inattendus seront discutées lors de cette conférence.

Biography - Dr. Maurice Levasseur

Dr. Maurice Levasseur is a professor in the Department of Biology at Université Laval where he holds since 2002 the Canadian Research Chair on Climate Variability and Plankton Ecosystems. He is also chair of the Canadian SOLAS Network (csolas.dal.ca). His research interests are the marine production of the climatically-active gas dimethylsulfide (DMS) and the ecophysiology of harmful algal blooms. He is also adjunct professor at the Department of Oceanography at Dalhousie University and at Université du Québec à Rimouski (UQAR). Before moving to Université Laval, Professor Levasseur was Head of the Primary Production Section at the Maurice-Lamontagne Institute, Department of Fisheries and Oceans, Canada.

Biographie du Dr. Maurice Levasseur

Dr. Maurice Levasseur est professeur au département de biologie de l'université Laval où il est titulaire depuis 2002 de la chaire de recherche du Canada en variabilité climatique et écosystèmes planctoniques. Il est également président du réseau de recherche canadien SOLAS (csolas.dal.ca). Ses intérêts de recherches sont la production marine du gaz diméthylsulfure (DMS) et l'écophysiologie des floraisons d'algues nuisibles. Il est également professeur adjoint au département d'océanographie de l'université de Dalhousie et à l'Université du Québec à Rimouski (UQAR). Avant son arrivée à l'Université Laval, le Professeur Levasseur était chef de la section production primaire à l'Institut Maurice-Lamontagne du ministère des Pêches et des Océans du Canada.

Proposed amendments to CMOS Constitution and By-Laws

Proposed changes and additions to the By-Laws	Purpose
ARTICLE 4 - The Executive and Council The Executive of the Society consists of the President, the Vice-President, ***the Past President***, the Treasurer, the Corresponding Secretary, and the Recording Secretary. It also includes the Executive Director and the Director, CMOS Publications, who are ex-officio and without voting privileges. The Council of the Society consists of the Executive, ~~the immediate Past President,~~ the three Councillors-at-Large, and the Chairpersons of the Centres as well as the Chairpersons of the CMOS committees appointed by Council.	To make the Past President a member of the Executive in conformance with current practice
BY-LAW 1 - Membership a) In accordance with Article 3 of the Constitution, the membership of the Society consists of: Regular Members Sustaining Members Corporate Members Student Members ***Fellows*** Honorary Fellows ~~Fellow Members~~ Associate Members	To re-order and rename
~~e~~g) The title "Honorary Fellow" may be granted to persons ***who are not members of the Society and*** who have made ***particularly*** outstanding contributions to the scientific, professional, educational, ***forecasting or broadcasting*** ~~and weathercasting~~ fields in atmospheric or ocean sciences in Canada or abroad. An Honorary Fellow is proposed by the Council on recommendation of a Fellows Committee, and must be approved by an Annual General or Special Meeting.	To make more specific To better reflect oceanography
~~g~~e) The title "Fellow of the Society" may be granted to members of the Society who have provided exceptional long term service and support to the Society and/or who have made outstanding contributions to the scientific, professional, educational, ~~and~~ ***forecasting or broadcasting*** ~~weathercasting~~ fields in atmospheric ~~and~~ ***or*** ocean sciences in Canada. A Fellow ~~membership~~ is proposed by Council on the recommendation of a "Fellows Committee", and must be approved by an Annual General or Special Meeting. A Fellow must be a member in good standing. ***Active Fellows should not comprise more than 5% of the membership. The number approved in any one year shall not exceed 0.5% of the membership.***	To better reflect oceanography To limit the number of Fellows
h) Associate membership is open to members of cognate ~~Canadian~~ Societies under conditions agreed upon by the Council. These conditions will usually include reciprocal arrangements.	To open Associate membership to members of non-Canadian societies
I) Each member in good standing~~, in all categories except for Associate Members and Honorary Fellows~~ shall have the right to exercise one vote.	To give all categories of member the right to vote

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

Proposed changes and additions to the By-Laws (Continued)	Purpose
BY-LAW 2 - Annual Membership and Subscription Fees. a) ~~The~~ ***Changes in the annual*** membership fee**s** ~~for each calendar year~~ shall be established at ~~the~~ *a* preceding Annual General Meeting. e) ***Changes in the*** ~~A~~annual subscription fees for Society publications ~~are~~ ***shall be established*** by ~~the Executive or~~ Council.	To remove the requirement to set fees at every AGM unless changed. To make Council responsible for subscription fees changes
BY-LAW 10 - Appointed Officers a) Council shall appoint an Executive Director and ~~a Director, CMOS Publications and~~ *a* ***Privacy Officer*** and determine their term s of office. ~~b)~~ b) The duties of the Executive Director and the ~~Director, CMOS Publications~~ ***Privacy Officer*** are given in Appendix II to these By-Laws.	To change responsibility for appointment of the Director of Publications To add a Council-appointed Privacy Officer
APPENDIX I TO BY-LAWS **PRIZES AND AWARDS** ***h) The Neil J. Campbell Medal for Exceptional Volunteer Service*** ***The Neil J. Campbell Medal for Exceptional Volunteer Service may be awarded each year to a member who has provided exceptional service to CMOS as a volunteer. The award may be made for an exceptional contribution in a single year or for contributions over an extended period. The contribution should have resulted in an important advancement for CMOS and/or its aims, nationally or locally***	To add new award
APPENDIX II TO BY-LAWS **DUTIES OF ELECTED AND APPOINTED OFFICERS OF THE SOCIETY** 1. The duties of the Executive ~~members~~ ***and Councillors-at-large*** shall be ~~as follows~~: ***f) Councillors-at-large*** ***Councillors-at-large are to be assigned specific responsibilities by either the Council or Executive in consideration of the need to:*** ***i) liaise with other related bodies,*** ***ii) serve on an ad hoc Finance and Investment Committee, a Communications Committee, represent Council on the Scientific Program Committee of Congresses or*** iii) ***undertake special studies or analyses***. 2. The duties of the Appointed Officers shall be as follows: a) The Executive Director ***vi) The Executive Director may appoint and determine the duties of a Director of Publications, an Office Manager and others as needed, subject to the approval of Council.*** ~~b) The Director, CMOS Publications~~ ~~i) The Director, CMOS Publications shall manage all business aspects of the Society's Publications.~~ ~~ii) The Director, CMOS Publications shall chair the Publications Coordinating Committee.~~ ***b) The Privacy Officer*** ***The Privacy Officer shall be responsible for investigating complaints regarding the application of the CMOS Privacy Policy and for recommending changes to that Policy as required.***	To describe duties of the Councillors-at-Large To make the Executive Director accountable for appointments in the CMOS headquarters Office and to remove administrative detail from the By-Laws To add a description of the duties of the new Privacy Officer

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

Modifications proposées à la constitution et aux réglements de la SCMO

Modifications et additions proposées à la constitution	Objectif
ARTICLE 4 - Le bureau et le conseil d'administration Le bureau d'administration de la Société se compose d'un président(e), d'un vice-président, ***du président sortant***, d'un trésorier, d'un secrétaire-correspondant, et d'un secrétaire d'assemblée. 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, ~~du président(e) sortant,~~ des trois conseillers et des présidents des Centres, ainsi que des présidents des comités nommés par le conseil d'administration.	Pour inclure le président sortant comme membre du bureau d'administration afin d'être conforme aux pratiques courantes.
RÈGLEMENT 1 - Adhésion a) Conformément à l'article 3 de la Constitution, les membres de la Société sont formés des : membres réguliers membres de soutien membres corporatifs membres-étudiants ***membres émérites*** membres honoraires ~~membres émérites~~ membres associés	Pour renommer et classer
e~~g~~) Les individus ***qui ne sont pas membres de la Société et*** qui ont ***particulièrement*** contribué exceptionnellement durant leur carrière aux domaines scientifique, professionnel, éducatif, aux domaines de la radiodiffusion ~~et de la prévision~~ dans les sciences marines ou atmosphériques, peuvent devenir "Membre honoraire". La désignation "Membre honoraire" doit être proposée par le conseil sous la recommandation du "Comité des honneurs" et doit recevoir l'approbation de l'assemblée générale annuelle ou d'une réunion spéciale.	Pour préciser davantage Pour mettre en valeur l'océanographie
~~g~~e) Les membres qui ont offert à la Société leur soutien et des services exceptionnels au cours de nombreuses années, et/ou qui ont contribué exceptionnellement aux domaines scientifique, professionnel, éducatif, ***aux domaines de la radiodiffusion*** ~~et de la prévision~~ dans les sciences marines ou atmosphériques peuvent être nommés "Membre émérite". La désignation de "Membre émérite " doit être proposée par le conseil sous la recommandation du "Comité des honneurs" et doit être approuvée lors d'une assemblée générale annuelle ou lors d'une réunion spéciale. Les "Membres émérites" doivent être membres en règle. ***On limitera les Membres émérites" à 5% ou moins de tous les membres. Pour chaque année, le nombre approuvé n'excédera pas 0,5% de tous les membres.***	Pour mettre en valeur l'océanographie Pour limiter le nombre de "Membres émérites"
h) Tout individu qui est membre d'une société ~~canadienne~~ analogue à la SCMO peut devenir membre associé, selon des termes approuvés par le conseil d'administration. Ces termes contiendraient généralement des ententes de réciprocité.	Pour faciliter la venue d'un membre d'une société non-canadienne à devenir membre associé
i) Chaque membre en bon état ~~de toutes catégories sauf celles de Membre Associé et de Membre honoraire~~ aura droit de d'exercer un vote.	~~Pour donner aux membres de~~ toutes catégories le droit de voter

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

Modifications et additions proposées à la constitution (Suite)	Objectif
RÈGLEMENT 2 - Cotisation annuelle et frais d'abonnement a) ***La modification du*** montant de la cotisation annuelle ~~est~~ sera déterminée ~~pour l'année à venir~~ à une assemblée générale annuelle ***précédente***. e) ***La modification des*** ~~Les~~ frais d'abonnement aux publications de la Société sera ~~sont~~ déterminée par ~~l'Exécutif ou~~ le conseil d'administration.	Pour éliminer toute exigence de fixer les frais à chaque AGA à moins d'avis contraire Pour donner au conseil d'administration la responsabilité de modifier les frais d'abonnement
RÈGLEMENT 10 - Membres désignés du bureau a) Le conseil d'administration désigne un directeur exécutif et un ~~directeur, publications SCMO~~, ***agent chargé de la protection des renseignements personnels*** et décide de la modalité de leurs fonctions. b) Les fonctions du directeur exécutif et ***de l'agent chargé de la protections des renseignements personnels*** ~~du directeur, publications SCMO~~, se trouvent en appendice II à ces règlements.	Pour modifier la responsabilité de la désignation du directeur des publications de la SCMO Pour donner au conseil d'administration la responsabilité de désigner un agent chargé de la protection des renseignements personnels
APPENDICE I AUX RÈGLEMENTS **PRIX ET HONNEURS** ***h) La médaille Neil J. Campbell pour service bénévole exceptionnel*** ***La médaille Neil J. Campbell pour service exceptionnel peut être décernée à un membre qui a rendu un service exceptionnel en tant que bénévole à la SCMO. La médaille peut être décernée pour une contribution exceptionnelle dans une seule année ou pour des contributions sur plusieurs années. La contribution devrait avoit fait progresser d'une façon importante la SCMO et/ou ses buts, au niveau national ou local.***	Pour ajouter une nouvelle récompense
APPENDICE II AUX RÉGLEMENTS **FONCTIONS DES MEMBRES ÉLUS ET DÉSIGNÉS DE LA SOCIÉTÉ** 1. Les fonctions ~~des membres~~ du bureau d'administration ***et des conseilles généraux*** sont ~~les suivantes~~: ***f) Conseillers généraux*** ***Les conseillers généraux seront mandatés pour des tâches spécifiques soit par le Conseil ou par l'Exécutif afin:*** ***i) d'assurer une liaison avec d'autres organismes reliés;*** ***ii) de siéger à un comité ad hoc sur les finances et les investissements, un comité des communications, de représenter le Conseil au Comité du programme scientifique des Congrès; ou*** ***iii) de mener des études et des analyses spéciales***. 2. Les fonctions des membres désignés du bureau sont les suivantes: a) Le directeur exécutif ***vi) Sujet à l'approbation du Conseil, le directeur exécutif peut désigner un directeur des publications, un chef de bureau ou autre personne requise et décider de leurs fonctions.*** ~~b) Le directeur, publications de la SCMO~~ ~~i) La gestion de tous les aspects relatifs aux publications de la Société est la responsabilité du directeur, publications SCMO.~~ ~~ii) Le directeur, publications de la SCMO, préside au comité de gestion des publications.~~ ***b) L'agent de la protection des renseignements personnels*** ***L'agent chargé de la protection des renseignements personnels sera responsable d'enquêter sur les plaintes en rapport avec la politique de la protection des renseignements personnels de la SCMO et de recommander des changements s'il y a lieu.***	Pour décrire les tâches des conseillers généraux Pour donner au directeur exécutif la responsabilité de nommer des gens au bureau d'administration de la SCMO et d'éliminer des règlements des détails administratifs Pour ajouter une description des fonctions du nouveau poste d'agent de la protection des renseignements personnels

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

IN MEMORIAM

Robert William Stewart
1923 - 2005

STEWART Robert William, O.C., F.R.S., F.R.S.C., Ph.D. Passed away peacefully in Victoria on January 19, 2005. Bob is survived by his wife Anne-Marie; his children Anne (Jack), Brian (Rosemary), Philip (Nicole) and Colin (Terry); his grandchildren Lara (Darryl), Michael, Alex and Caitlin and his great-grandson Julian. Bob was born in Alberta on August 21, 1923, raised in Olds and Calgary. He received his B.Sc. and M.Sc. from Queen's University and his Ph.D. in Physics from Cambridge University. He returned to Canada in the early fifties and became one of the first Canadian oceanographers. He had a distinguished and rewarding career as a research scientist and research manager for 40 years and was still interested in his field in his retirement; until a year ago he could be seen almost daily at UVic having lunch at the University Club and attending physics seminars. He participated in and led many international experiments and committees, travelling widely. Bob received many Canadian and international awards, but was most gratified by his "F.R.S.". At the end of his life he was content to be treated as one of the grandfathers of oceanography and was called upon to lecture on the "early days". He was a proud Canadian, choosing to dedicate his long career to Canada. He had an inquiring mind, was fierce in his search for knowledge, yet kind and loving in his family life, where he was considered affectionately as an "absent-minded professor".

From McCall Brothers, Funeral Directors Ltd, Victoria, B.C.

Three Books in search of a Reviewer
Trois livres en quête d'un critique

An Introduction to Ocean Remote Sensing, by Seelye Martin, Cambridge University Press, Hardback Cover, ISBN 0-521-80280-6, US$75.00.

Glaciers, by Michael Hambrey and Jürg Alean, Cambridge University Press, November 2004, ISBN 0-521-82808-2, Hardback cover, US$60.00.

Particulate Matter Science for Policy Makers: A NARSTO Assessment, Edited by Peter McMurry, Marjorie Shepherd and James Vickery, Cambridge University Press, November 2004, ISBN 0-521-84287-5, Hardback Cover, US$150.00.

ATMOSPHERE-OCEAN 42-4 Paper Order

AO-602
On the Variable-lag and Variable-Velocity Cell-To-Cell Routing Schemes for Climate Modesl, by L. Sushama, R. Laprise, D. Caya, M. Larocque and M. Slivitzky.

AO-604
Downstream Baroclinic Development among Forty-One Cold – Season Eastern North Pacific Cyclones, by Richard D. Danielson, John R. Gyakum and David N. Straub.

OC-244
Are Polynyas Self-Sustaining?, by R.F. Marsden, J. Serdula, E. Key and P.J. Minnett,

AO-603
Baseline Cloudiness Trends in Canada 1953-2002, by Ewa J. Milewska.

AO-421
On Predicting Maximum Snowfall Amounts in Alberta, by Max L. Dupilka and Gerhard W. Reuter.

REMINDER - REMINDER - REMINDER

HOW TO ACCESS THE MEMBERS ONLY WEB SITE

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USER NAME: THE FIRST SIX CHARACTERS OF YOUR FAMILY NAME (or less if shorter) FOLLOWED BY YOUR MEMBERSHIP NUMBER, without spaces

INITIAL PASSWORD: YOUR MEMBERSHIP NUMBER (on your address label)

In case of difficulty, please contact Lise at accounts@cmos.ca (613) 991-4494

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Call for Papers

39th Annual CMOS Congress
May 31- June 3, 2005
Vancouver, British Columbia, Canada

Abstract Submission Deadline: Feb 18 2005. Early Registration Deadline: April 15 2005.

Members of the Canadian Meteorological and Oceanographic Society and other interested persons are invited to submit abstracts for oral and poster presentation at the CMOS "***Sea to Sky***" Congress to be held near beautiful Vancouver, British Columbia, Canada. The Annual CMOS Congress is the foremost venue in Canada for the oceanographic and meteorological community in government, academia and private industry.

Contributions are sought on theoretical, observational, and technical aspects of oceanography and meteorology at all scales. We anticipate papers related to remote sensing of the oceans, atmosphere, and land, current meteorological and oceanographic observational programs, biological/physical coupling, regional and coastal oceanography, laboratory and numerical modeling of geophysical fluids, urban and biometeorology, climate modeling, prediction, and impacts, and weather forecasting issues.

In addition to contributed papers there will be plenary speakers on a range of topics, a commercial exhibitors' gallery, social events including an Icebreaker, the annual Awards Luncheon, the CMOS banquet, a partners program, and a daily weather briefing for aficionados. The following special sessions are currently planned:

- Health Issues in Weather and Climate
- Chemical Composition of the Troposphere
- GPS Atmospheric Moisture Retrieval and Applications
- Atmospheric Community Modeling
- Statistics in Oceanography and Meteorology
- Ocean/Cyclone Interactions
- Air Quality Forecasting
- Decision Support Systems for Forecasting
- Broadcast Meteorology
- Ocean Observatories
- The 2007 International Polar Year and the Future of Polar Science
- Canadian Arctic Shelf Exchange Study (CASES) and Related Research
- Physical impacts on Ocean Ecosystems
- Ocean-Atmosphere Interactions and their Influence on Ocean Biogeochemistry
- Advances in Private Sector Meteorology and Oceanography
- Offshore Environmental Factors for Oil and Gas Development

Courtesy of Vancouver Tourism Bureau

- The Role of Terrestrial and Oceanic Biogeochemical Cycles in the Climate System
- Lawrence Mysak Session on Ocean and Climate Dynamics
- Norman McFarlane Session on Physical and Numerical Aspects of Climate Modeling

Special sessions will feature at least one invited introductory or overview talk. It is anticipated that these sessions will form about one third of the program. Papers not designated for special sessions will be grouped with others of similar technical content. Multiple same first-author submissions are discouraged in order to limit the number of parallel sessions. Late submissions will be accepted ONLY if space permits. An expanded program of posters will foster more personal interactions.

Student CMOS members are welcomed and encouraged to apply for a Student Travel Bursary when submitting an abstract.

For conference details including plenary speakers and descriptions of the special sessions, instructions on electronic abstract submittal and presentation format, registration, hotel, travel and exhibitor information please see the conference web site www.cmos2005.ubc.ca or contact the program organizers at congress2005@cmos.ca

Demande de Communications

39ième Congrès annuel de la SCMO
31 mai – 3 juin 2005
Vancouver, Colombie-Britannique, Canada

Date limite de soumission des résumés : 18 février 2005. Date limite de pré-inscription : 15 avril 2005.

Les membres de la Société Canadienne de Météorologie et d'Océanographie et autres personnes intéressées sont invités à soumettre des résumés de communications qui seront présentés oralement et sous forme d'affiche au Congrès de la SCMO "***Entre Ciel et Mer***" qui aura lieu près de Vancouver, Colombie-Britannique, Canada. Le Congrès annuel de la SCMO est le lieu de rencontre privilégié au Canada des communautés météorologiques et océanographiques du gouvernement, du milieu universitaire et de l' industrie privée.

On recherche des communications sur les aspects théoriques, observationnels et techniques de l'océanographie et de la météorologie pour toutes les échelles. On s' attend à des communications sur la télédétection des océans, de l'atmosphère et de la terre, les programmes observationnels météorologiques et océanographiques, le couplage biologique/physique, l'océanographie régionale et côtière, la modélisation en laboratoire et numérique des fluides géophysiques, la météorologie urbaine et la biométéorologie, la modélisation du climat, la prédiction, et les impacts, et les problèmes associés à la prévision du temps.

En plus des présentations, il y aura des conférenciers pléniers sur une variété de sujets, une galerie d'exposants commerciaux, des activités sociales incluant un cocktail de bienvenue, le Déjeuner annuel de remise des Honneurs, le banquet de la SCMO, un programme d' activités pour les conjoints, et une présentation quotidienne des conditions météorologiques. Les sessions spéciales suivantes sont présentement prévues :

- Problèmes de santé associés au temps et au climat;
- Composition chimique de la troposphère;
- Extraction de données d'humidité par GPS et ses applications;
- Modélisation atmosphérique communautaire;
- Statistiques en océanographie et en météorologie;
- Interactions océan/cyclone;
- Prévision de la qualité de l'air;
- Systèmes d'aide à la décision pour la prévision;
- Présentation de la météorologie;
- Observatoires océaniques;
- Année internationale polaire de 2007 et le futur de la science polaire;
- Étude du plateau continental arctique canadien (CASES) et la recherche connexe;
- Impacts physiques sur les écosystèmes marins;
- Interactions océan-atmosphère et leur Influence sur la biogéochimie de l' océan;
- Progrès dans la météorologie et l'océanographie du secteur privé;
- Facteurs environnementaux marins affectant la recherche et l'exploration pétrolière;
- Rôle des cycles biogéochimiques terrestres et océaniques dans le système climatique;
- Session de Lawrence Mysak sur la dynamique des océans et du climat;
- Session de Norman McFarlane sur les aspects physiques et numériques de la modélisation du climat.

Gracieuseté du Bureau de tourisme de Vancouver

Les sessions spéciales incluront au moins une présentation invitée orale d'introduction ou un exposé général. On s'attend à ce que ces sessions occupent environ le tiers du programme. Les communications qui ne seront pas assignées aux sessions spéciales seront regroupées avec des communications semblables. On décourage les soumissions multiples ayant le même premier auteur afin de limiter le nombre de sessions concurrentes. Les soumissions en retard ne seront acceptées que si l'espace le permet. Un programme augmenté d'affiches encouragera plus d'échanges personnels. Les membres de catégorie étudiant de la SCMO sont bienvenus et sont encouragés à soumettre une demande de Bourse de Voyage pour Etudiant lors de la soumission de leur résumé de communications.

Pour plus d'information sur la conférence incluant les conférenciers pléniers et les descriptions des sessions spéciales, les instructions pour la soumission des résumés de communications sous forme électronique et le format des présentations, l'inscription, l'hôtel, information de voyage et information pour les exposants, veuillez consulter le site internet de la conférence www,cmos2005.ubc.ca ou communiquer avec les organisateurs du programme à congress2005@cmos.ca.

Arctic Climate Impact Assessment (ACIA) Report

The Arctic is warming at nearly twice the rate as the rest of the globe, according to a four-year scientific study of the region conducted by an international team of 300 scientists. These changes will have major global impacts, such as contributing to global sea-level rise and intensifying global warming. The assessment was commissioned by the Arctic Council (a ministerial intergovernmental forum comprised of the eight Arctic countries and six Indigenous Peoples organizations) and the International Arctic Science Committee (an international scientific organization appointed by 18 national academies of science). The ACAI study report is available at http://www.amap.no/acia/index.html.

New UNESCO Biosphere Reserves

Nineteen new sites in thirteen countries have been added to UNESCO's World Network of Biosphere Reserves, including the Georgian Bay Littoral Biosphere Reserve in Canada. Biosphere reserves are recognized places where local communities are actively involved in governance and management, research, education, training and monitoring at the service of both socio-economic development and biodiversity conservation. The World Network of Biosphere Reserves now consists of 459 sites in 97 countries. For information, access http://portal.unesco.org/en/ev.php-URL_ID=23365&URL_DO=DO_TOPIC&URL_SECTION=201.html

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COOGER Newsletter

COOGER Update, the newsletter of the Centre for Offshore Oil and Gas Environmental Research, based at the Bedford Institute of Oceanography in Dartmouth, Nova Scotia, is available at http://www.dfo-mpo.gc.ca/science/cooger-crepge/main_e.htm.

Ocean Yearbook

31 March 2005 is the deadline for manuscript submission for "*Ocean Yearbook: Volume 20*". The Yearbook publishes articles, reports and reference materials devoted to the issues and concerns affecting the world's oceans. Topics include: Ocean Governance; Living Resources of the Oceans; Non-living Ocean Resources; Transportation and Communications; Environment and Coastal Management; Maritime Security; Military Activities; Regional Developments; and Training and Education. For more information, please access http://as01.ucis.dal.ca/wag/template/uploads/law/oybguidelines.pdf

Maps of Canada's Coastal Zone Sea Surface Temperature

The Maurice Lamontagne Institute remote sensing laboratory operates two satellite image receiving stations allowing the acquisition of National Oceanic and Atmospheric Administration (NOAA) weather satellite data. These data are processed to calculate sea surface temperatures for use within oceanographic research projects and for ecosystem monitoring. Data are available as JPEG images for a series of nine regions covering Canada's coastal zones. For information, please access http://www.osl.gc.ca/teledetection/en/index.html

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Temperature and Salinity Data for the World's Oceans

Argo is an international project to collect information on the upper part of the world's oceans. Currently there are 1500 ocean-traveling float instruments operating. By 2006 there will be 3000 floats producing 100,000 temperature and salinity profiles per year. Applications include: ocean heat storage and climate change; ocean salinity changes due to rainfall; ocean-driven events such as El Niño; impacts of ocean temperature on fisheries and regional ecosystems; interactions between the ocean and monsoons; and how the oceans drive hurricanes and typhoons. For more information, please read the Argo press release published in the *CMOS Bulletin SCMO*, (Vol.32, No.6, p.169). Data and maps can be downloaded at http://www.argo.net

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New Publications and Reports

1) Papers presented at the World Ocean Forum in New York on 15-16 November 2004 are available at http://worldoceanforum.org/agenda.htm. Papers include "*Infinity Loss: Oceans Under Stress*" by Dr. Peter Harrison, and "*Coastal Ecosystems, Industrialization, and Impacts on Human Well-Being*" by Dr. Tundi Agardy.

2) A report entitled "*The Value of Natural Capital in Settled Areas of Canada*", commissioned by Ducks Unlimited and the Nature Conservancy of Canada, urges governments to get a better handle on the costs of degrading nature. It also describes the benefits lost to society when nature is destroyed. The report is available at http://www.natureconservancy.ca/pdf/en-natural%20capital.pdf.

3) Volume 26 of The Coastal Society Bulletin available at http://www.uhi.umb.edu/Issue_2004n3.pdf includes an article entitled "*Is It Time To Zone The Ocean?*".

RADARSAT-1 Monitors Disaster Sites in South Asia to Assess and Support Rehabilitation Efforts

January 10, 2005; Richmond, B.C. - Space-based imagery is being used to assess disaster areas and direct relief efforts to the hundreds of thousands of people struggling to survive in the wake of the December 26th 2004 tsunamis that hit South Asia. Canada's RADARSAT-1 satellite has been acquiring and continues to acquire imagery over the devastated regions in support of these efforts by international governments and aid organizations.

Over 70 archived RADARSAT-1 images of the affected regions are being used as baseline information to be compared with the newly acquired imagery in order to locate and assess damage and to help direct relief and rescue efforts. RADARSAT-1 provides synoptic coverage - up to 500 km by 500 km per image. This broad view is useful to highlight and map the dramatic changes and damage to coastlines due to impact of the tsunamis. In addition to supporting aid efforts, environmental agencies can use this data to understand the extent of destruction to the mangrove swamps and coral reefs that act as protective barriers to coastlines from wave erosion. Equipped with Synthetic Aperture Radar (SAR), RADARSAT-1 is collecting information over areas currently experiencing monsoon conditions (the sensor images through rain/clouds or darkness). These data are used to monitor and map flooding as well as to locate areas of standing water - potential breeding grounds for mosquitoes carrying malaria.

"*The true value of remote sensing is being demonstrated during this tragedy and devastation*," said John Hornsby, President of RADARSAT International. "*By combining and using the different information content provided by the various optical and radar satellites, a more accurate picture of the situation is revealed and this is imperative for the continued efforts and success of the world's largest humanitarian relief efforts.*"

For more information, please consult: http://www.rsi.ca/news/press/2005/nr_tsunami_10jan05.asp

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Prochain numéro du *CMOS Bulletin SCMO*

Le prochain numéro du *CMOS Bulletin SCMO* paraîtra en avril 2005. Prière de nous faire parvenir avant le 11 mars 2005 vos articles, notes, rapports d'atelier ou nouvelles à l'adresse indiquée à la page 2. Nous avons un besoin **URGENT** de vos articles.

Next Issue *CMOS Bulletin SCMO*

Next issue of the *CMOS Bulletin SCMO* will be published in April 2005. Please send your articles, notes, workshop reports or news items before March 11, 2005 to the address given on page 2. We have an **URGENT** need for your articles.

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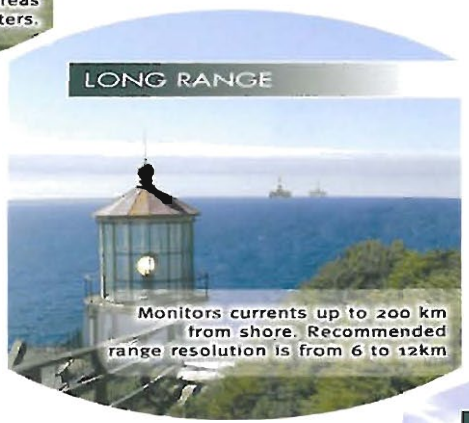

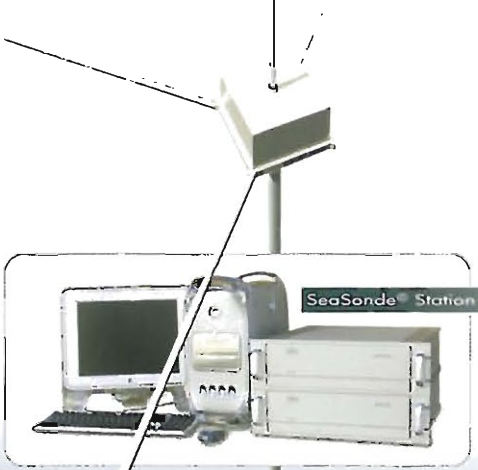

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