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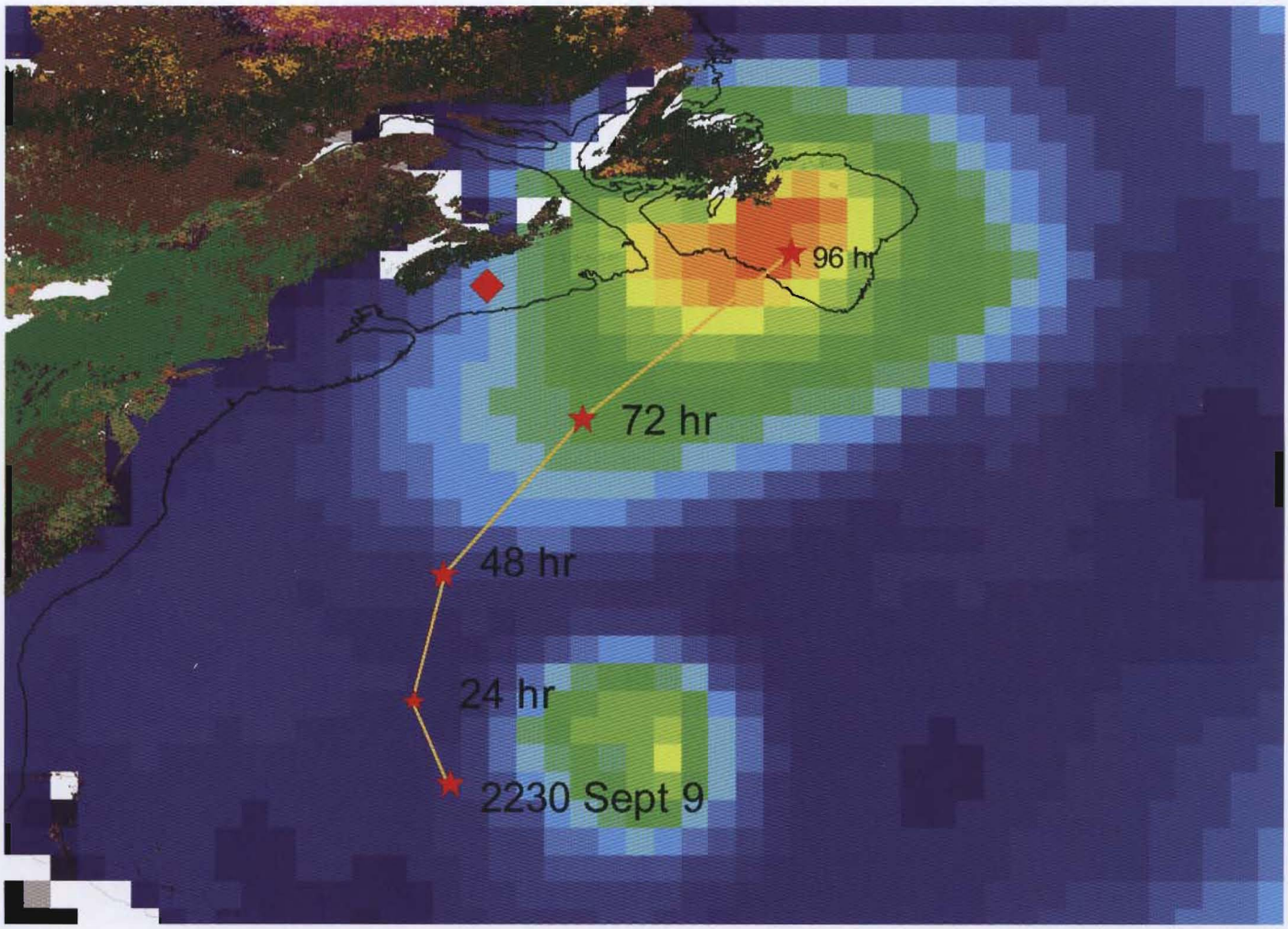

CMOS Bulletin SCMO
"at the service of its members / au service de ses membres"

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Cover page : The graphic shows the result of combining web service products. The coastal overlay (from the Canada Centre for Remote Sensing), the coloured significant wave height forecast (from Fisheries and Oceans), and the storm track of Hurricane Florence (orange line) combine to provide georeferenced information important to ship operations. The operating area of the CFAV Quest is denoted with a red diamond. Maximum forecasted wave heights south of Newfoundland are about 8 m. To learn more, please read the article on **page 17**.

Page couverture: L'illustration montre le résultat de la combinaison de produits de services sur le web. La surimposition des côtes (du Centre canadien de télédétection), la prévision de la hauteur significative des vagues (de Pêches et océans), et la trajectoire de l'ouragan Florence (ligne orange) sont combinées pour donner de l'information géoréférencée importante pour les opérations maritimes. L'aire d'opération du CFAV Quest est indiquée par un losange rouge. Le hauteur maximum des vagues prévues au sud de Terre- Neuve est d'environ 8 m. Pour en apprendre plus, prière de lire l'article en **page 17.**

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....from the President's Desk

Friends and colleagues:

Geoff Strong, CMOS President Président de la SCMO

November and December turned out to be one of our busiest periods this year. One duty for the president in early-December was to attend the CFCAS (Canadian Foundation for Climate and Atmospheric Sciences) meeting in Ottawa as ex-officio member of the Board of Trustees. This allowed me the opportunity to arrive a day early and visit our national CMOS office and participate in two other meetings on that day. I was very impressed by the volunteer efforts of our Ottawa staff (Ian, Richard, Dorothy, Paul-André, and all the others), who run the real day-to-day business of CMOS for us. Bouquets to the Ottawa staff!

I won't duplicate the 'highlights of meetings' which appears elsewhere in this issue. However, I would like to touch on *the* big issue that has been front and centre for us for at least the past year, has taken up much of my time, and which has increased in intensity this last few months. I'm referring of course to the on-going debate on climate warming. This issue is important enough that last fall we tasked our Science Committee with writing updated scientific statements that will be released very shortly (may in fact be already on our web site when you read this).

The public often ask 'what position should they take on climate warming', and even some CMOS members will ask "what answer do they give to questions on climate warming", when they are not themselves experts on climate change. My answer is that CMOS members are all, to one degree or another, climate scientists and while your expertise may not be in the area of climate change specifically, you respond just as you would to any other question on atmospheric or oceanographic issues. We have an obligation to rely on the refereed published literature and give our opinion based on that. [And it is not always appropriate to 'pass the buck' and refer someone on to another, if you think they may pull the same trick.] "*But*", you say, "*there are some published papers that refute some findings on climate warming*". True enough, I can even point you towards some, but that holds for just about anything that has been published in science. Think of Alfred Wegener (a meteorologist, by the way) who first published his theory on Continental Drift in 1912. Because he failed to come up with the root cause (sea-floor spreading), he was vilified by the geologic community and, by some accounts, died a pauper as a direct result, though his theory was finally proven by the early 1960s.

(Continued on page 2 / Suite à la page 2)

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Inside / En Bref

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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.

from the President's desk (continued / suite)

Who today would refute that the continents drift? Yet, climate science undoubtedly has far more data to back up present climate warming than geophysicists have in support of continental drift. I suppose scientific debate is not always fair, but it should at least be scientific.

There are three questions that I get asked most frequently by the public or by students of my sessional classes in meteorology and physical geography, which I summarize as follows:

> ***1. Has the climate really warmed significantly in the last 50 years (also define 'significant')?***
>
> ***2. Is the relationship between recent GHG increases and climate warming theoretically sound?***
>
> ***3. Can most observed warming be attributed to factors other than the greenhouse effect, for example, urban heat island effect?***

Based on major published literature, the answers respectively (unless I am reading all the wrong material) are clearly: *yes* (at the Hydrologic Cycle, maybe *no* on the Geologic Cycle timescales); *yes* (this has never really been a scientific debate in scientific textbooks for more than 100 years); and *no* (think of latitudes where the strongest warming is taking place and where major urban centres are located).

However, I recognize that some of you out there may have valid points in disagreement with this, or are simply unsure, and I therefore invite letters to the editor on these questions. Please limit responses to a short paragraph for each question, *and include* references to *major refereed literature* only. [I can guarantee that our Bulletin editor will limit space for this, and the shortest letters would have the highest probability for printing.] I may be opening a can of (dead) worms for debate, but I do so quite deliberately.

If you are an internet surfer, please keep watch for CMOS (and other) news on your web site at www.CMOS.ca. I would also suggest staying tuned for the IPCC's Fourth Assessment report, due in February, probably available even before you read this. Inside sources say that "*it will not only confirm the grim warnings of the past, but will also amplify them*".

In closing, let me pre-announce two important changes that we hope to implement this year. One concerns the need for a Communications Director for CMOS, already approved in principal by Council. Initially we perceive this person to be a volunteer like most of us in CMOS, perhaps with an honorarium offset. But ultimately, this position is important enough to warrant a paid employee or contract person - more on that later. Another long overdue change will be a membership fee increase. The last fee increase in 2001 was very modest, and CMOS undergoes the same rates of inflation as the rest of the world. Look for that to come in effect with our 2008 dues, subject to approval by our AGM.

Cheers,

Geoff Strong
President / Président

Highlights of Recent CMOS Meetings

November-December 2006

The following is a list of CMOS meetings during this period, including some abbreviated points of issues covered.

Nov. 08 – Teleconference with Gary Jarvis, President of Canadian Geophysical Union (CGU) and CMOS President, Executive Director, and Vice-President:

- Discussed mutual concerns on climate change issues, Congress2007, and a need for an over-riding joint national committee of CMOS, CGU, and related scientific societies; decided to meet more regularly, including full executives meeting at our joint Congress in St. John's.

Nov 15 – ad hoc Strategic Planning Committee (SPCom) meeting:

- Completed draft job description for a Communications Director, submitted to Executive and Council for approval.

Nov. 29 – CMOS Executive meeting:

- Voted support for the recommendation of a Communications Director by SPCOM; conducted other routine CMOS business.

Nov. – Scientific Committee

- Produce updated drafts of statements on climate change.

Dec. 07 – ad hoc Strategic Planning Committee meeting:

- Reviewed updated statements on climate change provided by the Scientific Committee, and recommended these on to Executive and Council.

Dec. 07 – Finance and Investment Committee meeting:

- Discussed diversification of CMOS investments (other than GICs), need for increases to Reserve Fund (to cover catastrophic losses and other emergencies), donations to CMOS, MOUs with government agencies, Centre finances and need to have updated financial reports from same, necessity for membership fee increase, etc.

Dec. 08 – CFCAS meeting, Ottawa

• President attended as ex-officio member of the Board of Trustees.

Dec. 13 – CMOS Council meeting

• Received verbal report on CFCAS from their Executive Director, detailed updates on past Toronto Congress finances as well as future 2007 (St. John's) and 2008 (Kelowna) Congresses, approved appointments of new Corresponding Secretary (Bill Hume) and Councillor-at-Large (Brad Shannon), approval to diversify CMOS investments, approvals to bring forward Constitution and By-law amendments and fee increases to Annual General Meeting, directed that the Executive complete statements on Climate Change and decide on their disposition, and complete revisions to job description for Communications Director and arrange initial staffing.

Next scheduled CMOS meetings are:

• *ad hoc* Strategic Planning Committee, 17 January;
• *Fellows* Committee, 25 January;
• Executive, 31 January and again in late-February;
• Finance & Investment Committee, 27 February;
• Council, 14 March.

Second Annual CMOS Photo Contest

We are pleased to announce that CMOS Members are invited to participate in the CMOS Photo Contest. Details can be found now on the CMOS Web Page at http://www.cmos.ca/photos.html and will also be published in the April issue of the *CMOS Bulletin SCMO*. The photos should be submitted to Bob Jones, webmaster@cmos.ca The deadline for submissions is **April 30, 2007.**

Deuxième concours annuel de photographies de la SCMO

Nous invitons les membres de la SCMO à participer au concours de photographies de la société. Les détails du concours sont présentement indiqués sur la page web de la SCMO à http://www.scmo.ca/photos.html . Ils seront de plus publiés dans le numéro d'avril du *CMOS Bulletin SCMO*. Les photos doivent être envoyées à notre webmestre Bob Jones à webmaster@scmo.ca. La date limite pour soumettre vos photos est le **30 avril 2007**.

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

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

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

Statistical Analysis of Environmental Space-Time Processes, by Nhu D. Le and James V. Zidek, Springer Science+Business Media Inc., 2006, ISBN 0-387-26209-1, Hardback, US$79.95.

Nonlinear Dynamics and Statistical Theories for Basic Geophysical Flows, by Andrew J. Majda and Xiaoming Wang, Cambridge University Press, 2006, pp.551, ISBN 0-521-83441-4, Hardback, US$90.00, 2 copies.

The Equations of Oceanic Motions, by Peter Müller, Cambridge University Press, ISBN # 0-521-85513-6, 2006, Hardback, US$80.

The Chronologers' Quest: The Search for the Age of the Earth, by Patrick Wyse Jackson, Cambridge University Press, ISBN # 0-521-81332-8, Hardback, US$30, 2 copies.

Numerical Weather Prediction: Richardson's Dream, by Peter Lynch, Cambridge University Press, ISBN # 0-521-85729-5, Hardback cover, US$75.

Next Issue *CMOS Bulletin SCMO*

Next issue of the *CMOS Bulletin SCMO* will be published in **April 2007.** Please send your articles, notes, workshop reports or news items before **March 2, 2007** to the address given on page ii. We have an URGENT need for your written contributions.

Prochain numéro du *CMOS Bulletin SCMO*

Le prochain numéro du *CMOS Bulletin SCMO* paraîtra en **avril 2007.** Prière de nous faire parvenir avant le **2 mars 2007** vos articles, notes, rapports d'atelier ou nouvelles à l'adresse indiquée à la page ii. Nous avons un besoin URGENT de vos contributions écrites.

WMO Statement on the Status of Global Climate in 2006 ***

Résumé: Selon l'Organisation Météorologique Mondiale (OMM), la température moyenne à la surface du globe en 2006 présente actuellement une anomalie positive de 0,42°C par rapport à la normale calculée pour la période 1961-1990 (14°C), d'après les relevés des pays membres de l'organisation. À ce jour, 2006 se place d'après les estimations au sixième rang des années les plus chaudes depuis le début des relevés, mais les chiffres définitifs ne seront publiés qu'en mars 2007.

Calculées séparément, les températures globales en surface dans l'hémisphère Nord (0,58°C au-dessus de la moyenne, qui est de 14,6°C) et dans l'hémisphère Sud (0,26°C au-dessus de la moyenne qui est de 13,4°C), en 2006, devraient occuper respectivement le quatrième et le septième rangs des températures les plus élevées depuis le début des mesures instrumentales, en 1861.

La température moyenne à la surface du globe a accusé une hausse voisine de 0,7°C depuis le début du XX^{e} siècle, mais cette progression n'a pas été continue. Depuis 1976, la hausse s'est nettement accélérée, atteignant 0,18°C par décennie. La période 1997-2006 est marquée par une anomalie positive moyenne de 0,53°C dans l'hémisphère Nord et de 0,27°C dans l'hémisphère Sud, toujours par rapport à la normale calculée pour 1961-1990.

GENEVA, 14 December (WMO) – The global mean surface temperature in 2006 is currently estimated to be +0.42°C above the 1961-1990 annual average (14°C), according to the records maintained by Members of the World Meteorological Organization (WMO). The year 2006 is currently estimated to be the sixth warmest year on record. Final figures will not be released until March 2007.

Averaged separately for both hemispheres, 2006 surface temperatures for the northern hemisphere (0.58°C above 30-year mean of 14.6°C) are likely to be the fourth warmest and for the southern hemisphere (0.26°C above 30-year mean of 13.4°C), the seventh warmest in the instrumental record from 1861 to the present.

Since the start of the 20th century, the global average surface temperature has risen approximately 0.7°C. But this rise has not been continuous. Since 1976, the global average temperature has risen sharply, at 0.18°C per decade. In the northern and southern hemispheres, the period 1997-2006 averaged 0.53°C and 0.27°C above the 1961-1990 mean, respectively.

Regional temperature anomalies

The beginning of 2006 was unusually mild in large parts of North America and the western European Arctic islands, though there were harsh winter conditions in Asia, the Russian Federation and parts of eastern Europe. Canada experienced its mildest winter and spring on record, the USA its warmest January-September on record and the monthly temperatures in the Arctic island of Spitsbergen (Svalbard Lufthavn) for January and April included new highs with anomalies of +12.6°C and +12.2°C, respectively.

Persistent extreme heat affected much of eastern Australia from late December 2005 until early March with many records being set (e.g. second hottest day on record in Sydney with 44.2°C/111.6°F on 1 January). Spring 2006 (September-November) was Australia's warmest since seasonal records were first compiled in 1950. Heat waves were also registered in Brazil from January until March (e.g. 44.6°C in Bom Jesus on 31 January – one of the highest temperatures ever recorded in Brazil).


Home of WMO in Geneva

Several parts of Europe and the USA experienced heat waves with record temperatures in July and August. Air temperatures in many parts of the USA reached 40°C or more. The July European-average land-surface air temperature was the warmest on record at 2.7°C above the climatological normal.

Autumn 2006 (September-November) was exceptional in large parts of Europe at more than 3°C warmer than the climatological normal from the north side of the Alps to southern Norway. In many countries it was the warmest autumn since official measurements began: records in central England go back to 1659 (1706 in The Netherlands and 1768 in Denmark).

Prolonged drought in some regions

Long-term drought continued in parts of the Greater Horn of Africa including parts of Burundi, Djibouti, Eritrea, Ethiopia, Kenya, Somalia, and the United Republic of Tanzania. At least 11 million people were affected by food shortages; Somalia was hit by the worst drought in a decade.

For many areas in Australia, the lack of adequate rainfall in 2006 added to significant longer-term dry conditions, with large regions having experienced little recovery from the droughts of 2002-2003 and 1997-1998. Dry conditions have now persisted for 5 to 10 years in some areas and in south-west Western Australia for around 30 years.

Across the USA, moderate-to-exceptional drought persisted throughout parts of the south-west desert and eastward through the southern plains, also developing in areas west of the Great Lakes. Drought and anomalous warmth contributed to a record wildfire season for the USA, with more than 3.8 million hectares burned through early December. Drought in the south of Brazil caused significant damage to agriculture in the early part of the year with losses of about 11 per cent estimated for the soybean crop yield alone.

Severe drought conditions also affected China. Millions of hectares of crops were damaged in Sichuan province during summer and in eastern China in autumn. Significant economic losses as well as severe shortages in drinking water were other consequences.

Heavy precipitation and flooding

As the 2005/2006 rainy season was ending, most countries in southern Africa were experiencing satisfactory rainfall during the first quarter of 2006. In northern Africa, floods were recorded in Morocco and Algeria during 2006 causing infrastructure damage and some casualties. Rare heavy rainfall in the Sahara Desert region of Tindouf produced severe flooding in February damaging 70 per cent of food stocks and displacing 60,000 people. In Bilma, Niger, the highest rainfall since 1923 affected nearly 50,000 people throughout August. In the same month, the most extensive precipitation in 50 years brought significant agricultural losses to the region of Zinder, Niger. Heavy rain also caused devastating floods in Ethiopia in August, claiming more than 600 lives. Some of the worst floods occurred in Dire Dawa and along the swollen Omo River. Again in October and November, the Great Horn of Africa countries experienced heavy rainfall associated with severe flooding. The worst hit areas were in Ethiopia, Kenya and Somalia. Somalia is undergoing its worst flooding in recent history; some places have received more than six times their average monthly rainfall and hundreds of thousands of people have been affected. This year's floods are said to be the worst in 50 years in the Great Horn of Africa region. The heavy rains followed a period of long-lasting drought and the dry ground was unable to soak up large amounts of rainfall.

Heavy rainfall in Bolivia and Equador in the first months of the year caused severe floods and landslides with tens of thousands of people affected. Torrential rainfall in Suriname during early May produced the country's worst disaster in recent times.

After 500 mm of torrential rainfall during a five-day period in February, a large-scale landslide occurred in Leyte Island, the Philippines with more than 1,000 casualties. Although close to average in total rainfall, the Indian monsoon season brought many heavy rainfall events with the highest rainfall in 24-hours ever recorded in several locations.

Only months after the destructive summer flooding in eastern Europe in 2005, heavy rainfall and snowmelt produced extensive flooding along the River Danube in April and the river reached its highest level in more than a century. Areas of Bulgaria, Hungary, Romania and Serbia were the hardest hit with hundreds of thousands of hectares inundated and tens of thousands of people affected.

Persistent and heavy rainfall during 10-15 May brought historic flooding to New England (USA), described as the worst in 70 years in some areas. Across the US mid-Atlantic and north-east, exceptionally heavy rainfall occurred in June. Numerous daily and monthly records were set and the rainfall caused widespread flooding which forced the evacuation of some 200,000 people. Vancouver in Canada experienced its wettest month ever in November with 351 mm, nearly twice the average monthly accumulation.

Development of moderate El Niño in late 2006

Conditions in the equatorial Pacific from December 2005 until the first quarter of 2006 showed some patterns typically associated with La Niña events. These, however, did not lead to a basin-wide La Niña and, during April, even weak La Niña conditions dissipated. Over the second quarter of 2006, the majority of atmospheric and oceanic indicators reflected neutral conditions but, in August, conditions in the central and western equatorial Pacific started resembling typical early stages of an El Niño event (see WMO Press Release 765). By the end of the year, positive sea-surface temperature anomalies were established across the tropical Pacific basin. The El Niño event is expected by global consensus to continue at least into the first quarter of 2007.

Deadly typhoons in south-east Asia

In the north-west Pacific, 22 tropical cyclones developed (average 27), 14 of which classified as typhoons. Typhoons *Chanchu, Prapiroon, Kaemi, Saomai, Xangsane, Cimaron* and tropical storm *Bilis* brought deaths, casualties and severe damage to the region. Landed tropical cyclones caused more than 1,000 fatalities and economic losses of US$ 10 billion in China, which made 2006 the severest year in a decade. Typhoon *Durian* affected some 1.5 million people in the Philippines in November/December 2006, claiming more than 500 lives with hundreds still missing.

During the 2006 Atlantic hurricane season, nine named tropical storms developed (average: ten). Five of the named storms were hurricanes (average six) and two of those were "major" hurricanes (category three or higher on the Saffir-Simpson scale). In the eastern North Pacific 19 named storms developed, which is well above the average of 16; eleven reached hurricane strength of which six attained "major" status.

Twelve tropical cyclones developed in the Australian Basin, two more than the long-term average. Tropical cyclone *Larry* was the most intense at landfall in Queensland since 1918, destroying 80-90 per cent of the Australian banana crop.

Ozone depletion in the Antarctic and Arctic
On 25 September, the maximum area of the 2006 ozone hole over the Antarctic was recorded at 29.5 million km², slightly larger than the previous record area of 29.4 million km² reached in September 2000. These values are so similar that the ozone holes of these two years could be judged of equal size. The size and persistence of the 2006 ozone hole area with its ozone mass deficit of 40.8 megatonnes (also a record) can be explained by the continuing presence of near-peak levels of ozone-depleting substances in combination with a particularly cold stratospheric winter. Low temperatures in the first part of January prompted a 20 per cent loss in the ozone layer over the Arctic in 2006 (see WMO Press Release 760). Milder temperatures from late January precluded the large ozone loss seen in 2005.

Arctic sea-ice decline continues
The year 2006 continues the pattern of sharply decreasing Arctic sea ice. The average sea-ice extent for the entire month of September was 5.9 million km², the second lowest on record missing the 2005 record by 340,000 km². Including 2006, the September rate of sea ice decline is now approximately -8.59% per decade, or 60,421 km² per year.

Information sources
This preliminary information for 2006 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 Members. However, the declining state of some observational platforms in some parts of the world is of concern.

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 UK Met Office, and the Climatic Research Unit, University of East Anglia, UK. The other is maintained by the US Department of Commerce's National Oceanic and Atmospheric Administration (NOAA). Results from these two datasets are comparable: both indicate that 2006 is likely to be the sixth warmest year globally.

More extensive updated information will be made available in the annual WMO Statement on the Status of the Global Climate in 2006, to be published in early March 2007.

*** This is a joint Press Release issued in collaboration with the Hadley Centre of the Met Office, UK, the Climatic Research Unit, University of East Anglia, UK and in the USA: NOAA's National Climatic Data Centre, National Environmental Satellite and Data Information Service and NOAA's National Weather Service. Other contributors are WMO Member countries: Australia, Belgium, Brazil, Bulgaria, Canada, China, Denmark, India, Ireland, France, Germany, Hungary, Japan, Mauritius, Morocco, The Netherlands, New Zealand, Norway, Romania, Sweden and Switzerland. The African Centre of Meteorological Applications for Development (ACMAD) also contributed.

Source: WMO Website http://www.wmo.ch on December 20, 2006. WMO Press Release # 768

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World Meteorological Organization
Intergovernmental Oceanographic Commission of UNESCO

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Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology

The Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology will be convening a Scientific / Technical Symposium on Storm Surges in Seoul, Republic of Korea on October 2-6, 2007. You are encouraged to participate in this event and submit your paper on the subject of:

- Storm surge modelling;
- Meteorological forcing;
- Other related issues.
- Operational storm surge forecasting;
- Regional application of storm surge techniques; and,
- Hindcasting and climatology;

The deadline for submitting an abstract is **30 April 2007**. For more information, please contact http://www.jcomm.info or contact Val Swail at val.swail@ec.gc.ca

Top 10 Canadian Weather Stories for 2006

by David Phillips[1]

Résumé: Il y a des provinces et des territoires qui semblent subir plus qu'à leur tour les événements météorologiques extrêmes au cours d'une année. Ces dernières années, c'est l'Alberta qui a été en tête de liste, avec des conditions rigoureuses, caractérisées par des précipitations excédentaires causant les pires inondations jamais eregistrées. En 2003, c'était la Nouvelle-Écosse qui a mené le bal, avec des ouragans, des creusements de dépression (« bombes météorologiques »), des inondations printanières. Cette année, c'est sur la Colombie-Britannique que Dame nature a jeté son dévolu, avec un nombre record de jours de pluie en janvier et un mois de novembre, qui n'a été épargné en rien- de la pluie et encore de la pluie, accompagnée de vents violents, de chutes de neige abondantes et d'un froid implacable. Finalement, la ronde de tempêtes de pluie de forte intensité le mois dernier ont entraîné d'importantes inondations et des dizaines de glissements de terrain, qui ont forcé les responsables à émettre un avertissement de faire bouillir l'eau à des millions d'habitants de la région du Lower Mainland. Décembre n'a guère été mieux, avec un trio de tempêtes, au milieu du mois, qui ont endommagé des dizaines de maisons, forcé la fermeture des grandes routes, renversé des milliers d'arbres, y compris des arbres centenaires dans le Stanley Park à Vancouver, et qui ont laissé un quart de million d'abonnés sans électricité. Entre les deux, il y a eu un été au cours duquel ce ne sont pas tant les conditions qui ont posé problèmes, mais le manque de conditions. En août, une sécheresse comme on n'en avait jamais enregistrée dans l'une des régions les plus pluvieuses du Canada a compliqué la vie des résidants et des touristes. Il y a eu 50 p. 100 de plus de feux de forêt que ce l'on enregistre normalement, et ceux ci ont ravagé le double de la surface habituelle.

Dans l'ensemble, les Canadiens ont eu suffisamment «d'intempéries» à surmonter en 2006. Nous avons connu des crues éclairs, des bombes météorologiques, de fortes chutes de neige et de la glace noire. De violents orages se sont abattus sur l'Ontario et le Québec, faisant au moins quatre victimes et laissant des centaines de milliers d'abonnés sans courant pendant des jours, souvent à plus d'une reprise. Dans les Prairies, un nombre record de tempêtes de grêle a endommagé des propriétés et des récoltes pour des millions de dollars et - pour la première fois en six ans - une tornade a fait une victime au Canada. Si les habitants du sud du pays semblaient très bien s'accommoder d'un hiver doux et confortable, les températures anormalement élevées ont créé des difficultés économiques à ceux qui dépendent des routes de glace en hiver. Les nouvelles n'étaient pas toutes mauvaises cependant! Cette année nous a fait grâce d'ouragans, de grandes sécheresses et de fléaux. Il n'y a pas eu de pannes de courant estivales, et il y a eu moins de blessures et de décès liés au climat. Il a fait chaud pour la dixième année d'affilée - le deuxième été le plus chaud jamais enregistré. L'année a de plus été marquée par un dégel dans l'ensemble du pays en janvier et par un été généralement confortable. Le temps a été si agréablement doux de janvier à septembre que plusieurs se sont sentis soit coupables, soit inquiets de devoir bientôt payer pour tout ce temps magnifique.

Top Ten Weather Stories for 2006

1	**B.C. Weather Woes Part I: So Much Rain, So Little Water**
2	**B.C. Weather Woes Part II: A December to Remember**
3	**Big Blows in Central Canada**
4	**Goldilocks of Summers**
5	**Prairie Hailers and a Deadly Twister**
6	**Nation-wide January Heat Wave**
7	**Active and Lengthy Wildfire Season**
8	**Surprise and Relief - A Quiet Hurricane Season**
9	**BC's Long Wet and Long Dry**
10	**Election Weather Confounds Pundits**

Dix événements météorologiques marquants pour 2006

1	**Malheurs météorologiques pour la C.-B. Partie I: Tant de pluie si peu d'eau**
2	**Malheurs météorologiques pour la C.-B. Partie II: un mois de décembre inoubliable**
3	**Grands vents au centre du pays**
4	**L'été des étés**
5	**Grêle et tornade motelles dans les Prairies**
6	**Vague de chaleur en janvier dans tout le pays**
7	**Saison d'incendies de fôret longue et active**
8	**Étonnement et soulagement: une saison des ouragans calme**
9	**Pluies et sécheresse interminable en C.-B.**
10	**Le temps des élections confond les grands chefs**

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Some provinces and territories seem to get more than their fair share of extreme weather events over the course of a year. In the last few years, Alberta has had that honour with a surplus of tough weather that included excessive rains leading to record flooding. In 2003, it was Nova Scotia with hurricanes, weather bombs and spring flooding. This year, British Columbia leads the pack as the #1 target for Mother Nature's wrath starting with a record number of wet days in January and moving along to a November that had it all - rain, rain and more rain, along with strong winds, huge snowfalls and bitter cold. Eventually the parade of high intensity rainstorms last month led to extensive flooding and dozens of landslides, prompting officials to issue a boil-water advisory for millions of people in the Lower Mainland. December hasn't been any better, with a trio of mid-month storms that damaged dozens of homes, closed major highways, toppled thousands of trees including century old trees in Vancouver's Stanley Park and left a quarter of a million people without power. Sandwiched in between was a BC summer where it wasn't too much weather that created problems but too little weather. In August, record dryness in one of the wettest places in Canada created difficulties for residents and tourists. Wildfires numbered 50 per cent more than normal and consumed double the usual area. On the whole, Canadians had plenty to "weather" in 2006. We endured flash floods, weather bombs, big snowfalls and black ice. Powerful thunderstorms in Ontario and Québec killed at least four people and left hundreds of thousands of customers without power for days, often more than once. On the Prairies, a record number of hail storms cost millions in property and crop losses and - for the first time in six years - there was a death from a tornado in Canada. While southerners seemed pleased over a balmy, comfortable winter, the unusually mild conditions created economic hardships for those dependent on winter ice roads.

The news wasn't all bad though! This year we were spared devastating hurricanes, severe drought and plagues. There were no summer blackouts, and we experienced less weather-related personal injuries and fatalities. For the tenth year in a row, it was warm - the second warmest on record. The year featured a nation-wide January thaw, and a summer of mostly comfortable weather. It was so pleasantly warm from January to September that many Canadians felt either guilty or concerned that somehow they were soon going to pay for the abundance of delightful weather.

The following Top Canadian Weather Stories for 2006 (See table listed above) are rated from one to ten based on factors that include the degree to which Canada and Canadians were impacted, the extent of the area affected, economic effects and longevity as a top news story.

#1) B.C. Weather Woes Part I: So Much Rain, So Little Water

It was a wicked November across British Columbia! The coast was hit often and hard with drenching rains, strong winds and high tides. At mid-month, provincial emergency workers were summoned at 4:00 a.m. to deal with a tsunami warning on the West Coast, while the end of the month was marked by heavy snows and bitter cold. Refueled by subtropical (feeds?) from Hawaii, the storms came onshore day-after-day dropping their wet cargoes on the "wet" coast. The huge storm on November 5-6, dubbed the Pineapple Express, was associated with the remnants of Typhoon Cimaron, the strongest storm to hit the Philippines in eight years. What was especially unusual was not the frequency of the storms but the intensity of the rainfalls. In some instances, 10 to 15 mm of rain per hour fell for 15 consecutive hours, creating a huge potential for flooding. There was no doubting the tropical origins of the air mass as temperatures hit a record high of 17°C.

The storm dumped its heaviest load on Chilliwack swelling already brimming rivers. The Chilliwack River was roughly 20 times its normal flow. Every river in the Lower Mainland, the south coast and the southern half of Vancouver Island rose close to or above flood stage - water levels expected only once in 50 years. Intense rains triggered mudslides, washouts and flooding. In turn, highways closed and hundreds of residents along the Chilliwack River had to evacuate their homes. Five days later another storm battered the coast with more rains and strong winds, leading to what was becoming a common occurrence: cancelled BC ferry sailings, grounded aircraft and power outages.

None of the November tempests had the impact of the storm on November 15 - the worst in two years, according to BC Hydro. Before noon, the storm had blocked seven provincial highways, toppled power lines leaving an estimated 200,000 in eight communities without electricity and collapsed a steel-framed building under construction in East Vancouver. Remarkably, there were no serious injuries. In the watersheds around Vancouver, rainfalls in excess of 150 mm in 15 hours soaked already waterlogged soils. Because dozens of the landslides muddied the water in three Vancouver reservoirs, turbidity levels in the water treatment system rose 30 times the target causing drinking water that had never been cloudier. Consequently, two million residents in Canada's third largest city were advised to boil their water, the widest water warning in Canadian history. With an increased risk of bacteria and viruses in the water supply, health officials declared tap water unsafe for drinking, brushing teeth or washing fruits and vegetables. The advisory was partially lifted the next day, but it remained in effect for nearly a million residents in parts of Vancouver, Burnaby and the North Shore for another 10 days. On November 19, another Pacific storm brought an additional 60 to 90 mm of rain and strong winds to coastal British Columbia.

But just when you thought it couldn't get worse, it did! A series of snowstorms on November 25 blanketed the southwest with record snowfalls over six days and a cold Arctic outflow dropped temperatures to –12°C in Vancouver. The biggest storm dropped 40 to 60 cm of snow in the eastern Fraser Valley. Abbotsford Airport broke its one-day snowfall record for November with 44.1 cm of the white

stuff. Downed trees and snapped snow-laden branches left thousands without power.

In the final wrap up, November rainfall and snowfall totals at British Columbia's two largest cities were impressive. Snowfall at Vancouver International Airport amounted to 38.6 cm. Victoria had six days of snow with two back-to-back 15+cm days. Its monthly accumulation of 40 cm was the second greatest November total in 66 years of weather record-keeping and 91 per cent of an average year's accumulation.

With 350.8 mm of rain and snowmelt in November, Vancouver tied the record for the wettest November and the wettest month ever set in November 1983. Remarkably, in 2006, Vancouver set two new monthly precipitation records: one in January (283.6 mm) and another in November (350.8 mm). Victoria was even wetter in November! Its monthly total of 351.9 mm surpassed the total for the previous wettest month of 342.6 mm recorded in January 1953.

#2) B.C. Weather Woes Part II: A December to Remember in BC

Residents of Vancouver Island and BC's Lower Mainland were reeling following one of the most powerful storms in history on December 15. It was the third blast in five days with all storms packing wind gusts well in excess of 100 km/h. The three storms lined up off the coast at the beginning of the week and - one after another - headed due east one day apart for Vancouver Island and BC's Lower Mainland. Three powerful storms in less than a week are bad enough, but to have them strike the same location straight-on is unprecedented. Some questioned El Niño or global warming but it was more likely just plain old bad luck.

The storm on December 11 lacked the rains of November, but its bluster crippled an already fragile power grid. Wind gusts were 96 km/h strong, enough to blow over two planes at the Victoria Airport. Anything not fixed or tied down became airborne. On December 13, another powerful storm with hurricane-force winds once again walloped the southwest. It brought down more trees and power lines - some repaired only a day before. BC Hydro called for reinforcements from Alberta and Yukon to relieve workers who had been putting in 16-hour days non-stop for three-and-a-half weeks.

The third blast on December 15 produced the biggest punch and proved to be the worst of the season, surpassing the others in intensity and in the number of blackouts. In the early morning, winds shattered speed records as they howled in from the Pacific, toppling groves of trees seeded two centuries ago. The storm's destructive power was compared to that of Typhoon Freda in 1962. Winds topped 124 km/h in Victoria. At Race Rocks in the Juan de Fuca, winds hit 157 km/h prompting hurricane-force wind warnings.

At the peak of the storm, a record quarter of a million customers lost power. Several thousands had to go days before power and telephone service were restored. Hydro veterans could not remember a more devastating storm as they struggled to keep a strained electrical grid from total collapse. B.C. emergency personnel described the weather as the most destructive storm event for hydro and telephone infrastructure in the province's history. Stanley Park was closed for days after thousands of trees were felled by the high winds. Over $100 million in property losses made it the most damaging and expensive windstorm in recent memory. People were calling it B.C.'s "Ice Storm". At Whistler, about 60 cm of snow fell in 24 hours, causing hundreds of motorists to be stranded on the Sea-to-Sky highway for 14 hours. Some people abandoned their vehicles and walked the few kilometres into Whistler through waist-deep snow.

Already this year about one million BC customers have lost their power, mostly because of the weather. The end of the year is usually stormy along the BC Coast, but the ferocity and the frequency of the storms this year is unprecedented. Since the beginning of November, nine storms have punished the coast - three times what is usual.

#3) Big Blows in Central Canada

While the summer was to the liking of most Ontarians, it was not without its powerful killer storms. In total, 19 tornadoes struck the province - more than the normal 14. But it was three big summer wind blows that created unprecedented havoc across Ontario and western Québec.

On July 17, 2006, a series of powerful storms ripped from Manitoulin Island to North Bay and Mattawa, then on to Deep River and into Québec. The hot, moist air mass that had been baking residents for days lifted as a cold front approached. The atmosphere exploded, firing off a myriad of wild winds - funnel clouds, straight-line winds, microbursts and tornadoes. The fast-moving, well-organized storm dealt a large swath of damage nearly 400 km long. While intermittent, a Warning Preparedness Meteorologist in Ontario stated the storm track was one of the longest in Ontario's history. The storms scythed across the province, splintering trees, snapping hydro poles and downing power lines. The combination of strong winds, lashing rain and thousands of lightning strikes left many communities in chaos, prompting several municipal leaders to declare states of emergency. At the end, two people had been killed and 250,000 people were without power. The region around North Bay, Callander and Mattawa was hit the hardest. North of Toronto in Newmarket, two tornadoes packing winds up to 180 km/h did considerable damage to a factory and an apartment roof, and carried fencing more than 200 metres. Over all, though, it was hydro outages that caused most of the grief across Ontario. High-voltage circuits were downed and electricity poles snapped like twigs. Numerous transformer stations were also damaged. More than 800 hydro workers were involved in the restoration effort and, according to the provincially-owned utility Hydro One, this series of storms inflicted the worst

damage to the provincial power grid since the 1998 ice storm.

Heading to Québec, the storm continued to wreak havoc causing major flooding and significant property damage from Abitibi to Québec City. The Abitibi-Temiscamingue region received between 40 and 50 mm of rain and wind gusts between 90 and 120 km/h. The powerful winds uprooted trees, overturned boats and took down telephone poles. Thousands of people lost power and/ or had their basements fill with water. Around the Saint-Honoré area, torrential rains were responsible for a landslide. Most areas in western Québec experienced a combination of 50 mm of rain, 2-cm diameter hail or wind gusts reaching up to 120 km/h.

Back in Ontario, a second major storm hop-scotched through hundreds of kilometres of cottage country on August 2-3 leaving properties once again in shambles. At Combermere, north of Bancroft, an F2 category tornado packing winds between 180 km/h to 240 km/h inflicted extensive damage. Its twisting winds tossed docks on shore and pushed cottages off their foundations. Once-towering, century-old pines were reduced to stumps and de-barked. In Gravenhurst, the storm peeled back the roof of the local curling rink. It was a miracle that no-one was killed or seriously injured. Environment Canada confirmed that the weather system on August 2 triggered 14 tornadoes, including two F2 touchdowns. It was the highest number of tornadoes for a single event ever in the province and represented what Ontario normally sees in one year.

Hydro One and the Insurance Bureau of Canada estimated that the two big summer storms cost nearly $100 million. The storms left hundreds of thousands of residents without power for five days and whole sections of the electrical grid needed reconstruction. Over 1,000 poles and more than 200 transformers had to be replaced.

The August 2 storm once again crossed into Québec, raging from Abitibi to Estrie. Violent wind gusts between 85 and 110 km/h felled tracts of trees, leaving more than 450,000 people without electricity - some for more than 4 days. Total storm rainfall exceeded 100 mm at several localities. The thunderstorms caused two deaths: one in Saint-Alexis-des-Monts, in the Mauricie region, when a man was struck by lightning and another in Montréal when a tree fell on a vehicle.

On September 23-24, a third major storm left more than 90,000 Hydro One customers without power in the Georgian Bay area. More than half were still in the dark four days later. Like previous storms that summer, this one also inflicted damages and outages in Québec. Gusts peaked at 93 km/h in Montréal, knocking down trees, damaging buildings and leaving as many as 100,000 Hydro-Québec customers without power for several hours.

#4) Goldilocks of Summers

Few Canadians dared complain about the summer of summers in 2006. Nationally, it was the second warmest on record. Temperatures averaged 1.4 degrees above normal, eclipsed only by the summer of 1998 when positive departures were 1.7 degrees. The entire country basked in the warmth, with the greatest departures more than 3 degrees above normal near the Northwest Territories-Nunavut boundary.

Following two truly miserable summers - a record cold in 2004 and record wet in 2005 - southern Manitoba continued the trend with record dryness in 2006. Until August, Winnipeg was on pace to set the dubious record for the driest summer ever. The June-July rainfall total of 39.5 mm eclipsed the 47.5 mm record set in 1886, while July itself was the driest ever with only 10.5 mm compared to 13.5 mm in 1875. Further, the city recorded its second driest April-through-July with about 40 per cent of its normal rainfall. Even though the skies finally opened up with rain in August, it wasn't enough to stop Winnipeggers from living through the third driest summer ever and the driest since 1929. In Portage la Prairie, a record was set for its driest ever June-to-August. But not everywhere in Manitoba was dry. In the north, Churchill experienced its third wettest July on record.

As for temperatures, the province topped 35°C for the first time in three years. Winnipeg recorded its second warmest average July maximum temperature - a torrid 29.8° (4 degrees above normal). Happy Winnipegers said it was one of the best summers in a long time with warmer temperatures and no rain. To take full advantage of their first hot summer in years, residents in Manitoba flocked by the thousands to beaches and swimming pools. Water consumption in Winnipeg was up 17 per cent over a nine-year average. For a while, the dryness suited farmers. They prayed for warm, dry weather given the misery of the two previous summers. Although their prayers were answered, it continued to be dry in June and July to the point of drought with once bumper crops beginning to shrivel.

For the majority of Edmontonians, summer 2006 proved to be one of the best ever. The city had 11 days of 30°+ temperatures and several near misses - a far cry from the last two summers with only one hot day each. The 35.1° on July 22 was the fifth warmest temperature recorded in Edmonton; the last time it was that hot was 70 years ago.

Further west, a persistent ridge of high pressure over British Columbia kept the weather consistently warm and dry. Once again, Lillooet and Lytton battled it out for claim to the nation's hot spot. On July 21, Lytton was Sahara-hot when the temperature soared above 42°, topping the 1994 record. The size of the province-wide heat wave was very impressive. On July 21-22, 63 daily temperature records were broken across the province from Vancouver Island to Peace River country. Further, abundant sunshine was a tourist's dream come true. Hotels experienced record

occupancy as travellers swarmed the Sunshine Coast.

In southern Ontario, the summer of 2004 was too cold and wet, and the next year was "the hottest, sweatiest, dirtiest summer on record". For 2006, most Ontarians agreed that it was just right - the Goldilocks of summers. In Toronto, for example, the city baked in above 30° temperatures on 20 days; less than half the hot days in 2005 but 17 more than in 2004.

Adding to the weather delight, rainfall was "just right", keeping gardeners happy and lawns green. The perception that it had been a good summer was reinforced because of the 30 Saturdays, Sundays and holiday Mondays from the May long weekend to August 31, only 8 days were wet. Rains seemed to come when water was needed. Not only were amounts adequate but it was a consistent rain unlike last year's alternating bouts of dryness and soggy weather. Consequently, the corn was never higher, tomatoes never plumper, and farmers never happier. Ideal weather enabled farmers to harvest record yields of winter wheat. Corn and soybeans, Ontario's other major crops, also fared better with above-average yields expected. Not only did the summer bring reliable rains, it often fell at night delighting city folk.

Further, anyone with asthma or respiratory problems breathed easier. Ontario's Ministry of Environment issued only six smog advisories totalling 17 days, which is a vast improvement from last year's 15 advisories totalling 53 days. On several occasions, the summer proved you can have heat and humidity without smog. Comfortable Ontarians responded by using 70 per cent less energy than 2005. That not only saved them money, but it also spared the GTA from frustrating brownouts and blackouts. Fossil-fuel generation declined by 17 per cent on lower demand but hydro revenues fell by 9 per cent over the previous year.

Whereas record high rainfall was the big talk across the Maritimes, Newfoundland-Labrador boasted the warmest June and July ever recorded. Atlantic Canada as a whole experienced its third warmest summer in nearly 60 years, with only the summers in 1967 and 1999 fractionally warmer.

#5) Prairie Hailers and a Deadly Twister

Weather forecasters and storm chasers had a hectic but exciting summer across the West. The summer storm season started and ended quietly, but from mid-June through mid-August there were only 17 days that did not have severe weather happening somewhere on the Prairies. For four days of the summer, there was severe weather happening in all three provinces.

Extensive hail swaths are a much feared but expected part of Prairie summer weather. In 2006, the "white combine" was worse than ever. At the beginning of the harvest in August, untimely hail was especially destructive. Of the primary severe weather categories for summer - winds, tornadoes, heavy rain and hail - by far the greatest number of reports dealt with large hail, about one-and-a-half times the normal number. In fact, hail events set a record in all three provinces with 221 in total, breaking the record of 179 set only last year.

On July 6, a severe thunderstorm with golf-ball sized hail pummelled Calgary. The next day a two-hour storm produced more windshield-smashing hail and rain so intense it flooded basements and stranded motorists. Also, early that morning, hail trashed crops and gardens near Eckville AB surprisingly early in the day - even for hailstorm alley! The summer's most devastating hailer occurred on August 10, when a supercell storm in central Alberta produced hail as large as tennis balls. Traffic slowed to a crawl as hail driven by strong winds made driving difficult. Snowplows were taken out of storage to clear highways and airport runways. Outside Red Deer, a hail strip measuring about 30 km long and 12 km wide was 80 to 100 per cent destructive to what was looking like a bumper crop. At Springbrook, AB, damage to 400 homes reached into the millions of dollars. Almost every householder reported holes punched through vinyl siding and broken windows. Trees were denuded. Slushy hail drifts piled up along the highways were still evident the next day. Insurance adjusters were brought from nearby provinces to handle the high volume of claims.

The next day the storm raced into Saskatchewan. Around Regina, near-baseball sized chunks of ice flattened crops, damaged siding and eavestroughs, broke shingles, cracked windows and pockmarked vehicles. Many crops and gardens received a severe beating and lay flat. Thousands of birds died, their skulls crushed by gigantic hailstones falling at speeds of over 150 km/h. Another ferocious hailstorm earlier in the summer hit Wakaw SK on July 7. In less than 15 minutes, baseball-sized hail and 100 km/h winds wreaked havoc on the community. The Canadian Crop Hail Association reported crop losses of $100 million in Saskatchewan alone, the highest damage payment in more than a decade.

Surprisingly, tornado occurrences were down in Alberta and Saskatchewan with only 5 and 7 tornadoes respectively (normals are typically in the mid-teens). On the other hand, Manitoba had more than its usual number of twisters with 15 (normal is 8). Five thunderstorms struck on August 5 triggered by a cold front that stretched from the northern Inter-lakes region to Minnesota. One tornado devastated the tiny community of Gull Lake MB 80 km northeast of Winnipeg, uprooting century-old trees, flipping vehicles and boats, and destroying numerous small buildings, a fishing lodge and an eight-person outhouse. It also killed a 64-year-old woman and injured dozens of others. The fatality was the first death from a tornado in Canada since 12 people died at a Pine Lake, Alberta, campground in July 2000 and the first in Manitoba since a tornado ripped though Rosa claiming three lives in July 1977. The tornadic outbreak left a grotesque tangle of uprooted trees, trailer debris, crumpled roofs and twisted metal.

#6) Nation-wide January Heat Wave

Whether you were on Granville Avenue in Vancouver, Portage and Main in Winnipeg, or Water Street in St. John's, Canadians were asking the same thing: Where is winter? With the jet stream fixed in a west-to-east track, mild Pacific air flooded the country throughout January that resembled a month-long national chinook. It became the most protracted, intense January thaw ever. The cold pole that usually hovers over Yukon or around Hudson Bay was far away over Greenland or Siberia, leaving parts of Europe encased in ice.

Because of January's lengthy thaw, December to February was the warmest winter season in almost 60 years of national weather record-keeping with an average temperature of 3.9 degrees. From the Beaufort Sea into Northern Saskatchewan, average temperatures exceeded an incredible seven degrees above normal. Several Canadian cities experienced their warmest January on record. Even Winnipeg, arguably the coldest major city in the world, averaged a whopping 10.3 degrees above normal in what traditionally has been the coldest month. Every Manitoba weather station except Gillam and Churchill set new highs for January. Winnipeg had only 3 days below –20°C (normally it's 20 raw days). Kelowna also registered its warmest January on record with every day from December 21 to February 15 featuring melting days.

The unprecedented mildness led to the cancellation of winter carnivals, dogsled races, ice fishing derbies, pond hockey tournaments, and created snow too soggy for sculpting. For those people keen on building an outdoor skating rink, it became a non-starter. On the other hand, the unseasonably mild weather was welcomed for its huge energy savings. Natural gas usage was down nearly 20 per cent. Consequently, most energy utilities reported much lower revenues from lower customer consumption.

The protracted January thaw meant substantial savings to road and highway departments clearing snow. Housing starts were up and generally construction workers favoured the unusually mild and comfortable winter. Further, fewer collisions and equipment breakdowns were reported due to the absence of snow, ice and cold. On the other hand, construction and drilling projects in soft surfaces faced long delays. Loggers in Yarmouth County, Nova Scotia complained it was the worst winter in recent memory with mild weather making it difficult to access the forest and weight restrictions on roads making it nearly impossible for wood to be trucked. Everywhere, road crews worked flat out patching hundreds of potholes a day. It is one of the earliest and one of the most expensive pothole seasons ever. With thaw-freeze cycles repeated almost every 24 hours, city streets began crumbling a month earlier than usual. Maximum ice concentration in the Great Lakes occurs around mid-February when nearly half the lake surface is ice-covered. In 2006, less than 15 per cent of the lake surface had ice. Thinned lake and river ice meant water courses on snowmobile trails could not support heavy grooming machinery. Consequently, snowmobile sojourns, and sales and services were flat.

The January thaw was a crisis for those depending on winter- and ice-roads. Winter roads are a lifeline for remote northern communities receiving the bulk of their non-perishable foods, fuel and building materials by truck. Having to fly in goods and products, shippers face higher freight tariffs. At Yellowknife, ideal temperatures (–30°C or lower) for building ice roads numbered only 13 for the entire winter compared to a normal number of 55 days. Overall winter temperatures in the Mackenzie region averaged a phenomenal 7.4 degrees above normal. Many aboriginal leaders declared states of emergency. One native chief couldn't recall a milder winter. Twenty years ago winter roads could be counted on to stay open for nearly two months, but in some recent years they've been open only half that time. Winter roads that did become usable opened later and closed earlier. Ice roads serving the diamond mines in the NWT had an ice thickness one third less than usual. Roads never attained maximum weight limits. One company got less than half of its planned deliveries made.

#7. Active and Lengthy Wildfire Season

The Canadian wildfire season began early, ended late and was extremely active. The Canadian Interagency Forest Fire Centre in Winnipeg reported that the 2006 wildland fire season was above-average for both fire numbers and hectares consumed when compared to the recent 10- and 20-year averages. As of October 1, Canada recorded 9,482 fires (127 per cent of normal) - numbers not seen since the late 1980s. The area consumed amounted to 2,031,702.5 hectares (about 4 per cent more than average).

Out west, the wildland fire hazard worsened from May to mid-July, prompting Alberta to import fire crews in late June. In northern Alberta, the winter was the driest since 1889. It was exceptionally mild too. A flurry of wildfires in and around Fort McMurray engulfed the northern Alberta city in smoke. Experts advised those with respiratory conditions to stay indoors or leave. By July 24, the fire situation became explosive. The province was on pace for a record-breaking wildfire season. Despite continued hot and drying weather, the absence of lightning saved the province from a disastrous conflagration. By season's end, fires in Alberta numbered 1,861 eclipsing the record set in 1998 when 1,696 wildfires ignited.

In Manitoba, the wildfire situation was quite volatile for most of the summer. New fire starts were occurring almost as quickly as old ones were extinguished. Fire crews were re-deployed from the north, where rainfall was plentiful, to the south where record dryness continued unabated. Officials issued strict travel restrictions.

On June 26, a massive forest fire in northern Saskatchewan threatened the hamlets of Stony Rapids and Fond-du-Lac forcing the evacuation of nearly 700 people. The sky around the region was a smoky orange and burning pine needles drifted like snow on the towns. By July 4, more than 2,000 people north of La Ronge had been evacuated. Of special

note, the Holy Trinity Anglican Church in Stanley Mission, SK - the oldest church west of the Red River, dating back to before 1860 - was under a fire threat. Volunteers installed a sprinkler system to save the historic structure.

From July onwards, the bulk of the western wildfire threat was centred in British Columbia. Sporadic wet and dry lightning, high temperatures, low humidities, and unruly winds challenged fire crews. On Canada Day, dry, hot weather created a high-to-extreme fire risk over three quarters of the province. At Tumbler Ridge, about 150 km northeast of Prince George, 3,500 residents and 500 non-residents (oil and gas workers and tourists) were told to leave. On July 24, BC's Gulf Islands experienced their worst fire conditions in 20 years. A forest fire on Galiano Island forced 150 people - more than one tenth of the island's population - to flee their homes. The fires disrupted ferry traffic and shut down the all-important tourism business. At the end of August, a large fire in northern Washington threatened to cross the Canadian border into British Columbia. Early on September 3, the Tatoosh fire spread into the province consuming more than 1,000 hectares near the fringes of Manning Park. Thick smoke made it unsafe to put crews on the ground to fight blazes or launch aircraft to view them from the air.

By mid-September, wildfires were still going strong in British Columbia and Ontario. In fact, the second week of September was the second largest fire occurrence week of the wild fire season. In Ontario, a relatively quiet fire season erupted in early September creating concerns for several northwestern communities. Unprecedented bone-dry forest litter ignited nearly 300 fires, forcing 1,000 people out of their homes and into shelters and hotels near Thunder Bay. Windy weather fanned flames, making containment even more difficult. Residents remarked how strange it was to see the fall colours on fire. The raging fires sent thick clouds of acrid smoke over the eastern parts of Canada. The last time Ontario fire activity had been so active so late in the year was a quarter of a century ago.

8. Surprise and Relief - A Quiet Hurricane Season

This year, the National Hurricane Center in Miami forecasted that the Atlantic basin would see 13 to 16 named storms (normal 10). Of these, 8 to 10 would be hurricanes (normal 6), with 4 to 6 intense hurricanes (normal about 2.4). They later trimmed their predictions for named storms and hurricanes by one.

As it happened, the season was very close to the 50-year normal. There were nine named storms, including five hurricanes (2 major), making it the quietest season since 1997. However, it was well below what the Atlantic Ocean offered up over the last decade. During the period 1996-2005, the average number of named storms, hurricanes, and intense hurricanes was 15, 8, and 4 respectively. Further, not a single hurricane hit the United States mainland - only the 11th time since 1945. Even the two major hurricanes (*Gordon and Helene*, which both made it to Category 3 status), stayed out in the Atlantic Ocean. It was quite a contrast to the tropical storm season of last year that featured 28 named storms. Fifteen of those were hurricanes, four of which hit the United States and killed more than 1,500 people. Across the Atlantic and Gulf coasts, the season brought relief and few regrets about the millions of dollars spent on stepped-up preparations. Insurance losses from North Atlantic tropical storms amounted to less than half of one per cent of the record outlays in 2005.

Experts concluded that a late blooming El Niño in the Pacific helped suppress the formation of storms in the Atlantic by creating more shearing crosswinds that tend to rip apart hurricanes. Further, sea-surface temperatures were nowhere as warm as they were in 2005 and the Atlantic trade winds contained much more dust from the Sahara Desert. Further, winds and pressure patterns were less favourable for the formation and growth of tropical storms in 2006. And upper-level air currents that push the storms northward were farther east than usual this year, keeping many tropical storms out to sea, away from the North American coast.

Of the nine tropical storms in 2006, more than half affected Canadian territory. On June 15, post-tropical storm *Alberto* gave Nova Scotia and Newfoundland a pretty good dousing with strong winds and rains that knocked out power to some communities. On July 21, the remains of tropical storm *Beryl* soaked and buffeted southern New Brunswick and Nova Scotia and later Newfoundland. Total storm rainfall exceeded 60 mm around Fredericton. Strong wind gusts exceeded 96 km/h on the southwestern tip of Nova Scotia.

During the Labour Day weekend, parts of southern Ontario were damp and chilly owing to a much dissipated tropical storm *Ernesto* moving through the province. *Ernesto's* winds caused problems on highways in what is the traditional peak of the moving season. During the CNE's air show, the rain wasn't a problem as much as the poor visibility and low clouds.

On September 13, hurricane *Florence* brushed by southeastern Newfoundland-Labrador, toppling trees, knocking out power and flooding property. The storm brought sheets of rain totalling 125 mm and generated high tides and hurricane-force winds along the coast. A weather buoy on Sagona Island at the west end of the Burin Peninsula recorded a peak wind of 163 km/h amid 10-metre waves. Elsewhere, winds clocked in at 133 km/h in St. Lawrence, NL. The hardest hit town was Francois, where a home was torn from its foundation and ripped in half by the high winds. The towns of Harbour Breton and Marystown, NL experienced falling trees and a high school was closed due to flooding. Florence was a full hurricane and the most destructive of the hurricane season for eastern Canada.

On October 2, for the second time in less than a month, another tropical storm brushed the south coast of Newfoundland-Labrador with the remains of hurricane *Isaac*. It packed some nasty weather: wind gusts up to

96 km/h and rains of 26 mm. On the same day, other parts of Atlantic Canada got 30 to 40 mm of rain and strong northeast winds of 40 km/h - gusting at times to 60 km/h - but none of the weather was associated with *Isaac.*

In spite of the quiet year, experts anticipate more storms and more frequent severe storms for the next 15 years. Early predictions for 2007 suggest at least 14 storms, including seven hurricanes (three of which are expected to strengthen into intense storms).

9. BC's Long Wet and Long Dry

From late December through January, a persistent weather front parked over the Pacific coast bringing pounding rains day after day to the Canadian "wet" coast, and a strong flow of mild, relatively dry Pacific air to the rest of the country. While Vancouverites had to endure a long spell of damp, gloomy weather, the rest of us were basking in unseasonable warmth from the same flow.

By the end of January the precipitation total in Vancouver was 283.6 mm, beating by a sliver the previous record of 281.8 mm in 1992 (normal 154 mm), but well below the all-time watermark of 351 mm set in November 1983. January also broke the record for the number of days with rain in any month - 29 of 31 days - and tied for the warmest January ever at 6.3°C. However, it was not so much the amount of rain that fell (although the amounts were impressive), but the fact that it rained so often. Day-after-day-after-day of rain for three straight weeks is unusual, even for Vancouver. Residents of the Lower Mainland came to calling it the Lower Rainland following never-ending downpours that were wearing out umbrellas and spirits. Officially, the lengthy water torture began on December 19 and continued relentlessly until January 14; 27 consecutive days and one day shy of tying the longest string of wet days on record. Many threatening rain clouds were in sight on January 15 and a few raindrops fell downtown and elsewhere, but no measurable rainfall (0.2 mm or more) occurred at the airport, where it counts.

Obviously, the dull, dreary, damp weather got people down. Irritation, depression and weather rage prevailed. Seasonal Affective Disorder (SAD), which is at its worst in January, seemed to afflict the entire population. During the rainy period, Vancouverites registered less than 12 hours of sunshine in 26 days compared to a normal amount of 54 hours. The only thing that kept people cheery was the thought of tying then breaking the previous mark for weather misery that ran 28 days from January 7 to February 3, 1953. But at one day shy, it didn't happen. The weather forced the postponement of several outdoor activities and raised concerns about mudslides in North Vancouver. On a positive note, the wet weather filled water reservoirs, kept crime down and umbrella and tarp sales up. Fortuitously, it was an insurance policy against a potentially dry summer.

And dry it was - record dry! Going into the Labour Day weekend, the resort town of Tofino on Vancouver Island's west coast is one of the wettest spots in Canada, declared it was running out of water, prompting emergency rationing. Lodgings and businesses were asked to shut down in order to conserve water in case of fire. Tofino averages 3,310 mm of precipitation a year - six times the Canadian average. Rainfall totals between May and August inclusive amounted to half the norm with no significant rainfall from July 14 to September 16. The August rainfall total was a paltry 5.6 mm, a new record low, and a long way from the normal 92.7 mm. Adding to the water stress were average temperatures 1 to 2 degrees warmer than normal and featuring several near 30°C days. One long-time resident claimed he'd never seen creeks so dry. The town's reservoir on Meares Island was nearly empty. How ironic that the picturesque community by the sea was enjoying its best weather in memory, only to be closed down by a summer-long drought.

Elsewhere on Vancouver Island, Port Alberni's May-to-August precipitation (67.4 mm compared to the usual 193.3 mm) was a mere 35 per cent of normal. At Victoria, 2.4 mm of rain fell in August with most coming on one day. Mind you, it was not the driest month on record. No rain fell in August 1986.

10. Election Weather Confounds Pundits

Canada's first winter general election in 25 years didn't have the face-numbing cold, hip-deep snows and blinding whiteouts that some had feared. Instead, the weather was very un-Canadian. The first few weeks of the campaign had its share of meteorological moments with slippery surfaces and zero visibility. At times on the Prairies, –40 wind chills halted door-to-door canvassing and few lawn signs could be put into the "permafrost". Before winter's first day, candidates in southern Ontario and Québec grappled with poor driving conditions and election signs buried by huge snowfalls or passing snowplows.

By the January leg of the campaign, however, unseasonably warm and dry weather prevailed, encouraging voters to the advance polls in droves with a 25 per cent increase over those voting early in the June 2004 general election. On Election Day, January 23, weather featured conservative amounts of precipitation and liberal degrees of warmth. Parts of Québec and Ontario had skiffs of snow, while some areas of British Columbia - including Vancouver - got rain or drizzle. An unusual warm front crossed southern Saskatchewan and Manitoba, bringing above-freezing temperatures. Newfoundland was cold and windy, but sunny. Where weather was a factor, residents still rose to the occasion and voted. When a blizzard struck tiny Tuktoyaktuk, NT, voters came by snowmobile or truck. One New Brunswick voter hiked past huge chunks of ice blocking a road, where a friend waited to pick him up. In the end, 65 per cent of eligible voters cast a ballot - an improvement from a record low of 60.9 per cent in our last general election.

First Runner-Up Story in 2006 - A Warming Canada

by David Phillips[2]

Résumé: Que l'année ait commencé avec l'hiver le plus doux des annales était un fait remarquable en soi. Mais ce qui a suivi a été réellement phénoménal - le printemps le plus chaud, et le deuxième été le plus chaud. Seul un automne moins spectaculaire, en 13e place des automnes chauds, a empêché l'année 2006 d'être la plus chaude en 60 ans d'annales météorologiques.

Les températures, pour les 12 mois de décembre 2005 à novembre 2006 inclus, ont été en moyenne de 2,3 °C plus élevées que la normale, et une fraction seulement inférieure à l'année la plus chaude enregistrée, en 1998. C'était aussi la dixième année consécutive de températures supérieures à la moyenne. Nous avons connu sept des dix années les plus chaudes depuis 1998. La situation était similaire dans tout le pays. Chaque région a enregistré des températures plus chaudes que la normale, l'Arctique ayant eu l'année la plus chaude jamais enregistrée et le Bassin du Mackenzie, la forêt boréale et le Canada atlantique, la deuxième année la plus chaude. Bien qu'El Niño contribue sans le moindre doute au réchauffement certaines années - et a certainement contribué dans une large mesure à faire de 1998 l'année la plus chaude - l'El Niño de cette année est arrivé à la fin de septembre et, par conséquent, ne peut se faire attribuer une bien grande partie du temps chaud de 2006. Les automnes doux au Canada poursuivent la tendance des températures supérieures à la moyenne, amorcée il y a plus de dix ans. Sur les 40 dernières saisons au Canada, deux seulement ont enregistré des températures plus froides que la normale: le printemps 2002 et le printemps 2004.

That the year began with the mildest winter on record was remarkable in its own right. But what followed was truly phenomenal - the warmest spring and the second warmest summer. Only a less spectacular fall, the 13th warmest on record, prevented 2006 from being the warmest in 60 years of weather-record accounting.

Temperatures for the 12 months December 2005 to November 2006 inclusive averaged 2.3°C warmer than normal and only a fraction below the warmest year in 1998. It was also the tenth consecutive year with above-normal temperatures. Seven of the warmest ten years have occurred since 1998. The story was similar across the country. Every region was warmer than normal, with the Arctic being the warmest year on record and the Mackenzie basin, the boreal forest, and Atlantic Canada, the second warmest. While El Niño undoubtedly contributes to the warming in some years - and was certainly a strong contributor to 1998 being the warmest year - this year's El Niño began late in September and therefore could not account for much of the warmth in 2006. Canada's warm fall continued a trend of above-average readings that has lasted for more than ten years. Over the past 40 seasons in Canada, only two have registered colder-than-normal: Spring 2002 and Spring 2004.

Temperature highlights across Canada for 2006

Winter 2005/2006 was the warmest in Canada since nation-wide records began in 1948, logging in at 3.9°C above normal. The entire country experienced above-normal temperatures, with most of Canada at least 2 degrees above normal. Alberta, Saskatchewan and the Northwest Territories all experienced temperatures greater than 6° above normal. Besides beating the previous winter anomaly by almost a full degree, winter 2005-2006 set the new high mark for temperature departures for any season.

Spring 2006 was 3.0° above normal, with most of Canada at least 2° above normal. Northern Saskatchewan, Manitoba, southern Nunavut, southern Northwest Territories, and northern Quebec all had temperatures at least 5.0° above normal. Moreover, the Arctic tundra and the eastern boreal forest experienced their warmest spring on record.

Summer 2006 was the second warmest on record at 1.4° above normal. No region had temperatures below normal and much of Canada was at least 1 degree warmer than usual.

January to October 2006 was the warmest ever, some 2.2° above normal, and slightly higher than 1998, which eventually became the warmest year.

Arctic Sea Ice Continues Its Decline

In each of the last five years, the Arctic sea-ice cover has dipped sharply to the smallest area dimension since it was first measured by satellites in 1978. The average sea-ice extent at the end of September 2006, when ice usually reaches its smallest extent, was 5.9 million square kilometres, the second lowest on record, missing the 2005 record by 340,000 square kilometres. Including 2006, the September rate of sea ice decline is now about –8.6 per cent per decade. Scientists suggest that the summer ice cover has reached a "tipping point" beyond which there is no return and will likely continue to decrease until the ice disappears sometime in the 21st century, marking the first time in a million years the Arctic Ocean is ice-free.

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

For the 2006 Canadian Record - Pour les annales canadiennes en 2006

November was the wettest month on record in Victoria	Le mois de novembre a été le plus pluvieux qu'ait jamais connu Victoria.
Vancouver experienced its wettest January and wettest November on record, with November tying for the wettest month	Vancouver a vécu les mois de janvier et de novembre les plus pluvieux jamais enregistrés, novembre ayant été le mois le plus pluvieux.
Winnipeg had its driest July and June-July on record	Winnipeg a connu le mois de juillet et la période juin-juillet les plus secs jamais enregistrés.
Edmonton recorded its highest temperature in 70 years	La température à Edmonton a été son niveau le plus élevé en 70 ans.
The Prairies witnessed a record number of hail events	Les Prairies ont subi un nombre record d'averses de grêle.
Winnipeg registered its warmest January on record	Winnipeg a enregistré son mois de janvier le plus chaud
Toronto had its "dullest" fall in 29 years	Toronto a eu l'automne le plus « couvert » en 29 ans.
Fredericton experienced a record number of July thunderstorms	Fredericton a reçu un nombre record d'orages en juillet.
Montréal had its rainiest year on record	Montréal a reçu plus de pluie que jamais.
Toronto's Pearson Airport registered its warmest night ever	L'aéroport Pearson de Toronto a enregistré la nuit la plus chaude de tous les temps.
Yellowknife had its snowiest November ever	Yellowknife a eu le mois de novembre le plus enneigé de tous.
Southern Ontario and Southern Québec had the wettest fall on record and possibly the wettest year ever	Le sud de l'Ontario et le sud du Québec ont enregistré l'automne le plus pluvieux et peut-être même l'année la plus pluvieuse.

In 2006, the eastern half of the Canadian Arctic - Hudson Bay and Baffin Bay had the lowest amounts of sea ice since ice reconnaissance observations began in 1971. In Hudson Bay, the total amount of ice over the summer season was one third less than the normal accumulation taken from the period 1971-2000. The lack of sea ice in Baffin Bay and along the Labrador Coast had a significant impact on tourism in Newfoundland-Labrador. With minimal sea ice to protect icebergs from eroding waves, few icebergs could survive the long drift southward in open water. None drifted as far south as St. John's for tourists to view. In the western half of the Canadian Arctic, sea ice returned closer to normal after three low years causing several ice breakers to get stuck briefly in the ice off the Alaskan coast in July.

Earth Warming Continues

A warmer Canada is in step with the rest of the world. Globally, 2006 was the 28th consecutive year with above-normal temperatures and the sixth warmest year on record. The ten warmest years globally have all occurred since 1990, the top three since 1998. According to the World Meteorological Organization in Geneva, the global average temperature has risen about three times faster since 1976 compared to that for the past 100 years. Now into the 21st century, global temperatures are more than 0.7°C above those at the beginning of the 20th century. Although yet another warm year is not itself evidence of enhanced climate change, the unprecedented increase in global temperatures in the past quarter century has added to the strong and compelling evidence of humankind's contribution to our changing climate.

Source: Meteorological Service of Canada - Environment Canada - Government of Canada, The Green Lane™ Website, 28 December 2006.

Source: Service Météorologique du Canada - Environnement Canada - Gouvernement du Canada, Site web La voie verte^MC, 28 décembre 2006.

The Utilization of Web Services while at Sea

by Anthony W. Isenor and LCdr Robert A. Stuart[1]

Résumé: Au début de septembre 2006, le NAFC Quest se trouvait sur la Plate-forme Scotian pour mener des essais d'ingénierie dans le cadre du Projet de démonstration de technologies pour la guerre sous-marine en réseau. Pendant que nous étions en mer, nous avons eu la chance d'avoir accès aux services Web offerts par deux ministères fédéraux, soit Pêches et Océans et Ressources naturelles Canada. Un système commercial installé à bord constituait une solution à faible coût offrant une connectivité Internet standard. Grâce à un logiciel commercial, on disposait d'un outil de cartographie et de géolocalisation qui permettait aussi d'accéder aux services de cartographie Web. Vu la facilité avec laquelle on a obtenu l'information et la géolocalisation du contenu des services, il faut considérer que l'utilisation de services Web en mer est une méthode plausible de cueillette d'information.

The first storm of the 2006 season to influence Eastern Canada was hurricane *Florence*. *Florence* had its greatest impact on Newfoundland on September 13. For the most part, Nova Scotia residents escaped its influence.

The above is a very 'land centric' view of *Florence's* influence. Those at sea typically have a much different perspective. For ship personnel, both the wind and sea state resulting from such weather systems are a concern.

On September 5th 2006, DRDC Atlantic's Canadian Forces Auxiliary Vessel (CFAV) Quest[1] departed Halifax for an engineering trial in Emerald Basin on the Scotian Shelf. The cruise was in support of the Networked Underwater Warfare (NUW) Technology Demonstration Project. Essentially, our sea time was intended to test communications equipment and application software in support of network-enabled operations (NEOps). The NEOps concepts revolve around the sharing of disparate pieces of information from all platforms within an operational force. In other words, data collected by a particular platform is shared and then combined with similar data collected by other platforms.

Of course, present military operations utilize shared information among the participants. However, the present sharing is largely based on voice communications or specialized data streams. In terms of data, the sharing is conducted over very specialized networks which only support specific message structures unique to that network. As well, these message structures only support the sharing of verified content. In other words, the structures support the sharing of content which has known accuracies. Voice communications are then utilized to share non-verified information content that allows collaboration between operators on the platforms.

NEOps effectiveness is greatly enhanced by the ability to share non-verified digital information. In a way, it is similar to a voice communication that would consist of someone saying "My sensors are picking up something of interest over there. Do your sensors detect anything in that area?"

In concept, the sharing of such information may sound like a rather straightforward operational goal. However, the complexities of establishing data-sharing links between software applications that were independently developed for the various platforms, is not a trivial task. As well, the existing network does not support distribution of such non-verified digital information.

The NUW engineering trial tested four networked nodes placed on two platforms, the CFAV Quest and the National Research Council[2] (NRC) Convair 580 airplane. The NRC Convair has an established record of collecting data in extreme conditions (e.g., they sometimes intentionally fly into hurricanes). In this trial, an Internet Protocol (IP) based network was created between the platforms. The network utilized military communication radios and sub-network relay hardware developed in Canada (i.e., Rockwell Collins, Inc., formerly IP Unwired Inc.). This allowed the formation of an ad hoc network that could transmit non-specific message content.

The NUW engineering trial was planned for September 5th to 15th. *Florence* passed by eastern Canada from September 11th to 14th. Although we didn't know it at the time, a CFAV Quest mechanical problem on the evening of September 10th would result in an early termination to the trial. We returned to Halifax on the morning of September 11th.

During the six days we were on the Scotian Shelf, we were very cognisant of the approaching storm. Of course, we were trying to obtain as much weather, wind and wave information as possible. Such information is useful for the planning of the daily operations including airplane arrival times, and the deployment and recovery of ship-based sensors.

[1] Defence Research and Development Canada – Atlantic
Dartmouth, NS, Canada

Traditional means provide weather and sea information through text based weather reports obtained from Environment Canada web pages. In this particular trial, CFAV Quest also had access to a Department of National Defence (DND) secure network. This allowed access to the DND Meteorological and Oceanography (MetOc) office in Halifax. The MetOc provides an assortment of environmental products, some produced at the MetOc office and others obtained from sources such as Environment Canada. These products are typically text or image based.

Text or image based products provide limited usability due to the static nature of the product. Text and images can be printed or viewed but manipulation or combination with other products is difficult. Now, the emerging trend is to provide products through web services over the Internet. Fortunately, we also had internet access through commercial satellite links, at a cost of about $7 Cdn per megabyte.

The internet connection combined with a commercial Geographical Information System (GIS) or mapping software, provided access to the web mapping services. The user simply directs the software to the provided services, expressed in a fashion similar to an HTTP address. The software then queries the address and obtains a list of available services, which are based on the web mapping service (WMS) standard. The Open Geospatial Consortium[3] (OGC) has established the WMS standard, and it is compliance with this and related standards that make the disparate services act as one integrated system.

The specific service of interest to us was the wave forecasts offered from Fisheries and Oceans. Wave conditions have obvious importance to the general comfort on-board a ship but they are also important for estimating noise levels in the water. As well, wave conditions are important during the launch and recovery of our sensors.

The wave forecast service was accessed through an established internet connection. The web service infrastructure automatically provides a list of available products – in this case a list of one hour forecasts over a 48 hour time period. The specific forecast time was then selected from the available list.

The wave forecast model output is offered as a service from Fisheries and Oceans[4] (Bedford Institute of Oceanography). We also accessed land-based overlays from the Canada Centre for Remote Sensing (Natural Resources Canada). The land overlay provided the necessary spatial context. The total process, from sitting down in front of the computer to printed product, took about four minutes.

So how is this better than simply downloading images from the web? The answer is the geo-referencing. Although the answer appears simple, the implications are immense. Images downloaded from web pages typically show a coastline and thus can be geo-referenced by the human eye - in a sense they are “visually” geo-referenced. However, the web mapping service provides the geo-referencing in the software environment. This provides one with the capacity to link multiple mapping services, and interact with these overlays in a geo-referenced manner. Of course one can still create visual products; but the strength is within the software environment. Mapping software also allows the user to create customized overlays which can also be added. An example of a customized overlay is the digitized storm track. While at sea, we were digitizing text-based messages of the predicted storm track and overlaying this with web mapping service content (see Figure 1on next page).

Many software applications provide access to web mapping services. We were using a demonstration version of a commercial off-the-shelf mapping tool. Since the obtained information is geo-referenced and seamlessly loaded into the mapping tool, other functions available in the tool can be used to provide additional information. For example, closest approach distance between the predicted storm track and the ship’s operating area is a matter of three mouse clicks; or, the ship’s track can be added from data feeds from a Global Positioning System input. Bathymetry can be automatically added as another overlay, thus providing context with bottom features.

The software environment allows the user to easily provide value-added products and information. The distributed nature of the services means the products remain under the control of the originating organisation and the local expertise that generated the product. As well, the services used here represent the combination of information from two separate government departments. It is very unlikely these departments were aware the other had complementary products available through web services. This is truly the power of web services - the combining of independently designed and built applications into a single system.

Summary

In early September 2006, CFAV Quest was on the Scotian Shelf conducting engineering trials in support of the Networked Underwater Warfare Technology Demonstration Project. While at sea, we were fortunate to have access to web services available from two government departments, Fisheries and Oceans and Natural Resources Canada. An on-board commercial system provided a low cost solution enabling standard internet connectivity. Commercial off-the-shelf software provided a mapping and geo-referencing tool which also enabled access to the web mapping services. The ease of obtaining the information and the geo-referencing of the service content makes the use of web services while at sea a plausible method of information gathering.

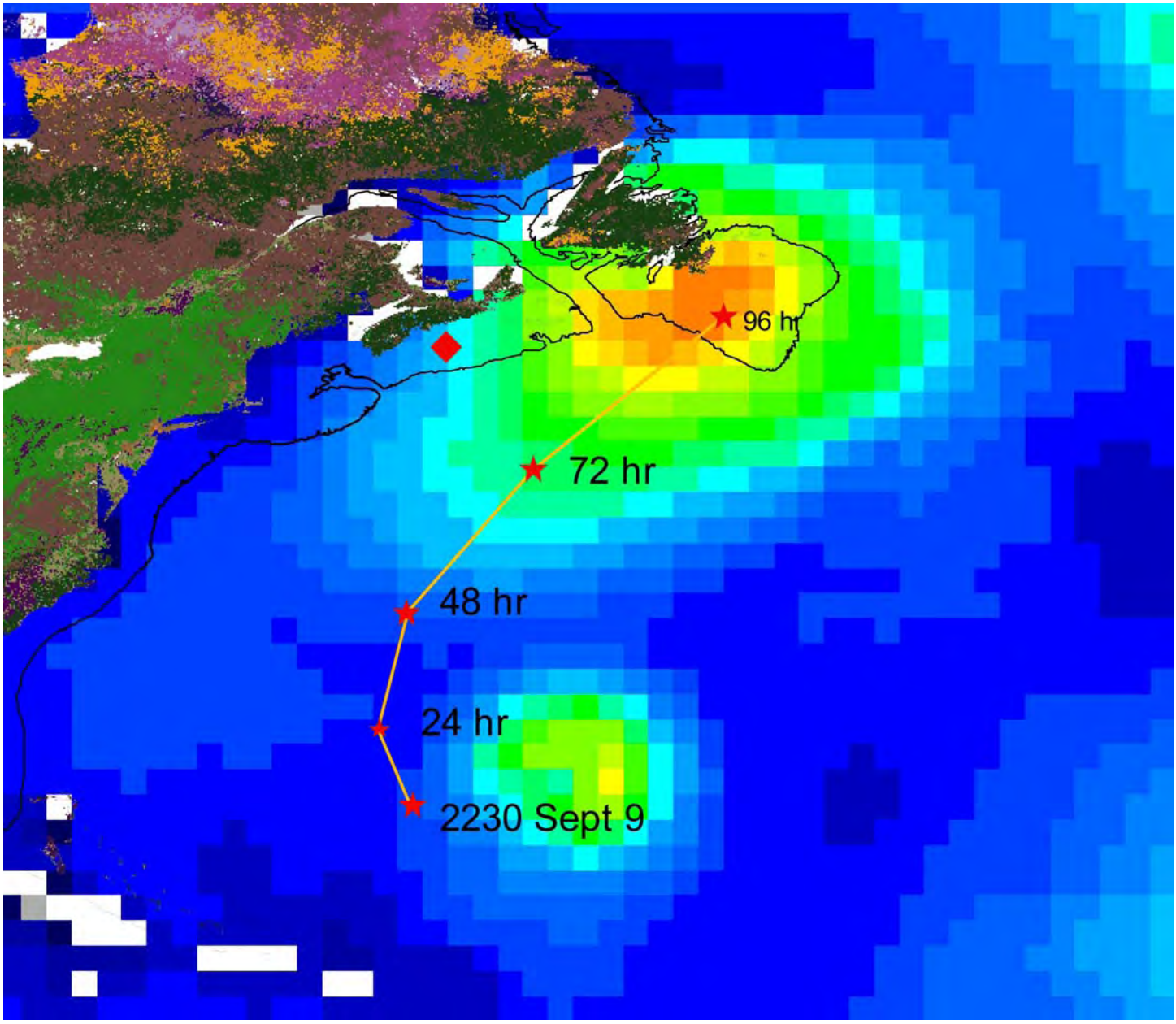

Figure 1. An example of combining two web service products. The coastal overlay was obtained from the Canada Centre for Remote Sensing; the coloured significant wave height forecast from Fisheries and Oceans; and the storm track of *Florence* (orange line) is based on a weather report from September 9, at 2230 Z. The operating area of the CFAV Quest is denoted with a red diamond. Maximum wave heights south of Newfoundland are about 8 m. The wave forecast was generated at midnight on September 12. The wave forecast corresponds to September 13, 2200 Z. A partial 200 m isobath is shown as a black line. The elevated wave heights east of Florida are the influence of hurricane *Gordon*. Also shown in colour on cover page.

References

1. For information regarding CFAV Quest, see http://www.drdc-rddc.gc.ca/ .

2. See National Research Council website at http://www.nrc-cnrc.gc.ca/ .

3. See Open Geospatial Consortium website at http://www.opengeospatial.org/ .

4. For a significant wave height forecast example, point your web mapping service to:
http://bluefin.mar.dfo-mpo.gc.ca/wmsconnector/com.esri.wsit.WMSServlet/ofcast_c_hs?

Sky in a Bottle

by Peter Pesic

2005, MIT Press, US$24.95, CND$27.87
ISBN 0-262-16234-2

Book Reviewed by Russell D. Sampson[1]

Much of modern physics is awesome but sadly distant from our senses. The cosmic background radiation, quarks and black holes - they are full of importance and the literature is spellbinding but what is there to actually see in our daily lives? The visible sky, on the other hand, is always present, always there to demonstrate its subtleties for those who take the time to look and to ponder. How are clouds formed? What causes the rainbow? As is true with so much of science it is the simplest questions that often lead to the most profound answers. This book explores the long and fascinating history of one of those simple questions; *what causes the colour of the clear sky*?

The basic structure of the book is chronological – starting with the early philosophers and ending in the 20th century. From early notions that the blue sky was due to atmospheric dust to our modern atomic perspective, Pesic gives us not only the results but the process of the search. The accounts of blind alleys, inspired guesses and the just plain hard labor of science helps to bring the topic to life. Pesic's style invites the reader to imagine how the pre-industrial thinkers approached the problem. Restricted to their more primitive technology, mathematics and science, they still made valuable insights. A major sub-plot of the book is how it became apparent in the 19th and early 20th century that the colour of the sky was contingent on the existence of the atom. This fascinating connection involves some of the heavy-weights in the history of physics, including Einstein and Maxwell.

Pesic, who is a professional musician as well as physicist, also describes the parallel narrative between the art's and science's exploration of the sky. These two ways of exploring the cosmos both wrestled with the nature of the uniquely pure and untextured blue sky. From the abstract expressionist paintings of Wassily Kandinsky to the cloud chamber experiments of C. T. R. Wilson – from the poetry of Wallace Stevens to Max Planck's "blackbody spectrum", Pesic intertwines these two world-views. Renaissance artists in an attempt to instill realism in their paintings carefully studied the visual phenomena that gave the illusion of depth to a landscape. Some of these 'tricks of the trade', the bluish cast on distant mountain sides, the decrease in contrast with increasing distance, were all recognized and studied by artists before they were thoroughly understood by the scientific community. Pesic's juxtaposition of these two cultures appears to shine a light on what may be gained from a serious dialogue between the arts and the sciences.

In chapter nine Pesic takes a somewhat tangential journey into Olbers' Paradox – one of science's most profound and historical puzzles. In the 19th century, Heinrich Wilhelm Olbers was perplexed by another rather simpleminded notion regarding the appearance of our sky: *If the universe is infinite in age and extent then why is the sky dark at night?* The logic of this conundrum insists that if the universe was infinite in size and age, then all our lines of sight would eventually fall upon a star and the night sky should therefore be as bright as the surface of the average star. The struggle to find a solution to this paradox forms part of the foundation of contemporary cosmology. Today we believe the solution lies in the finite age of our universe. Like the connection between the blue of the clear sky and the existence of the atom, this truly deep insight into our universe is there to ponder by simply looking up.

However, the book is not without its shortcomings. For a text whose basic premise is the colour of the sky, there is not a single colour image and except for the dust jacket, not a single photo of the sky itself. Many of the illustrations appear to be selected for their graphic appeal rather than their instructional power. Strangely, even though there are portraits of Rene Descartes, Augustin Fresnel and James Clerk Maxwell there is no image of the man whose name may be most synonymous with the phenomenon – John William Strutt – the third Baron Rayleigh or simply Lord Rayleigh.

There is also a handful of factual errors. For example, in chapter nine, the author states that the earth is about 10 billion years old and makes the common mistake of confusing the present age of the observable universe with its present radius. The current estimated age of the universe is about 13.7 billion years, but its radius is about 40 to 80 billion light years – depending on which cosmological model you use. This common misconception is due to the fact that distant objects are not as they *are* but as they appeared in the past. This is because it takes time for their light to reach us. Since the moment the light was first emitted, these objects have been carried along with the expansion of the universe and are currently much farther away than they appear in our sky.

The notes at the end of the book are almost a second book in itself, providing more depth and even some mathematics. As an educator, I especially enjoyed the descriptions on how to simulate the blue of the sky in the laboratory or classroom – the sky in a bottle. The index is extensive but

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is not exhaustive. In a simple test it failed to include all the references to quantum physics.

The book is engaging, entertaining and instructional and would appeal to readers of varying backgrounds. Much of the science Pesic describes will require at least a basic understanding of high school math and physics but I believe those who are less skilled will still find the story engaging and colourful.

Hydrology: An Introduction

by Wilfried Brutsaert

Cambridge University Press, August 2005
Hardback, 605 pages, ISBN 0-521-82479-6, US$75

Book Reviewed by Paul H. Whitfield[2]

Water in its many forms has always been a source of wonder, curiosity, and practical concern for humans everywhere. ***Hydrology - An Introduction*** provides a thorough introduction to the fundamental principles of physical hydrology. Brutsaert develops the topics of classical hydrology through rigorous formulations of their governing fluid mechanics from basic principles. Brutsaert's presentation demonstrates his broad personal experience and his passion for these topics. At the same time the presentation is relatively informal; that one would expect of a wise teacher - sharing his knowledge, wisdom, and experience with students.

The volume consists of thirteen chapters logically divided into four parts each with three chapters. The first part deals with water in the atmosphere – the fluid mechanics of the lower atmosphere, precipitation, and evaporation. In the second part water on the land surface is covered – the mechanics of free surface flow, overland flow, and streamflow routing. The third part deals with subsurface water – the mechanics of porous materials, infiltration and unsaturated flows, and groundwater outflow and baseflow. The final part covers flows at the catchment scale in response to precipitation – the mechanisms of streamflow generation, responses at the watershed scale, and a chapter on frequency analysis in hydrology.

Throughout the text, the phenomena are dealt with at the wide variety of spatial and temporal scales at which they occur in practice, making this of value to academics and practitioners alike. More importantly, Brutsaert presents these principles using a using a successful combination of thoroughly referenced prose, clear illustrations and well developed equations. Unlike many volumes, these three methods of presentation compliment each other effectively – an approach I would like to see become common. I appreciated the structure of the volume from the perspective of dealing with the key elements of the water "cycle" atmospheric, surface water and groundwater and the core topics within each.

However, a more complete introduction would include a chapter dealing with ecohydrology and one or two on sediment and water chemistry. While each chapter is thorough, I did feel that there was a degree of uneven coverage amongst the chapters. I found there to be a strong relationship between the length of the chapters and the number of citations to the work of Brutsaert and his colleagues. This means that several topics are extremely thoroughly covered – water aloft, evaporation, the three chapters on groundwater while others, particularly hydrologic modelling, and statistical hydrology did not receive the same extensive treatment. For example, the chapter on evaporation is 34 pages in length and contains 13 Brutsaert citations, while the one on streamflow generation is only 20 pages and contains no Brutsaert citations. I appreciated having access to the depth of knowledge on the former, but felt that a more extensive coverage was due to the latter.

I must admit that I particularly enjoyed the final chapter, and I must commend it to others. This chapter shows the philosophical side of Brutsaert and it provides the reader with access to a history of the ideas and the thought about how the hydrologic cycle has developed through human history. From Biblical references and ancient Greeks philosophers through the earliest experimentations of Perrault and Mariotte, Brutsaert provide a reflective perspective on man's continual fascination with the nature of water.

This volume is an important addition to my hydrology library, and I must admit I am pleased to have been able to add copies of it to those of my students and staff as well. The shortcomings I describe above by no means limit the usefulness of ***Hydrology - An Introduction***. However, the volume demands a working knowledge of physics and mathematics, since Brutsaert uses these extensively to develop descriptions of hydrologic phenomena. While this will restrict its academic audience, it does not detract from the fact that volume provides a remarkable, sorely needed foundational text.

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[2] Meteorological Service of Canada
#201 – 401 Burrard Street
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Canadian Meteorological and Oceanographic Society
Société canadienne de météorologie et d'océanographie

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Homepage: www.CMOS.ca Page d'accueil: www.SCMO.ca

CMOS UNDERGRADUATE SCHOLARSHIPS ($500)

Undergraduate scholarships are offered by the Canadian Meteorological and Oceanographic Society, valued at $500 each, to successful student applicants planning a career in atmospheric, hydrological, oceanographic or limnological sciences. These scholarships are tenable at any Canadian university.

Applicants must be Canadian citizens or have landed immigrant status and be in their penultimate undergraduate year; the scholarships are to support the students' final university year.

To be qualified, students should be taking four or more half courses in one or more of the following areas in their final year: meteorology, physical or chemical oceanography or limnology, hydrology or climatology.

Details are to be provided in the application.

Students are required to submit transcripts of academic studies, a statement of interest and intent and details of relevant work experience.

Two sealed letters of recommendation (in confidence) from university professors who are directly acquainted with and knowledgeable of the work of the student are to accompany the application.

Find application forms at http://www.cmos.ca/undergradschole.html and send to arrive by **15 April** to:

Executive Director CMOS
PO BOX 3211 STN D
OTTAWA ON K1P 6H7
Fax: 613-990-1617
Email: cmos@cmos.ca

BOURSES D'ÉTUDES DE PREMIER CYCLE SCMO (500 $)

Des bourses d'études de premier cycle, chacune d'un montant de 500 $, seront offertes par la Société canadienne de météorologie et d'océanographie aux étudiants dont la demande a été acceptée et qui planifient faire carrière dans les sciences atmosphériques, hydrologiques, océanographiques ou limnologiques. Ces bourses d'études ne sont valides que dans les universités canadiennes.

Les candidats doivent être citoyens canadiens ou détenir le statut d'immigrant admis et être dans l'avant-dernière année du premier cycle; ces bourses serviront à appuyer les étudiants lors de leur dernière année universitaire.

Afin d'être admissibles, les étudiants doivent suivre au moins quatre demi-cours dans au moins un des domaines suivants durant leur dernière année: météorologie, océanographie physique ou chimique ou limnologie, hydrologie ou climatologie.

Les renseignements doivent être indiqués sur le formulaire de demande.

Les étudiants doivent soumettre leurs relevés de notes d'études universitaires, un exposé d'intérêt et d'intention et les détails d'expérience de travail pertinent.

La demande doit être accompagnée de deux lettres de recommandation scellées (à titre confidentiel) de professeurs distingués qui connaissent personnellement le travail de l'étudiant.

Vous trouverez les formulaires de demande à http://www.cmos.ca/undergradscholf.html. Ils doivent être expédiés pour arriver au plus tard le **15 avril** à :

Le directeur exécutif de la SCMO
C.P. 3211 Succursale D
Ottawa, ON, K1P 6H7
Télécopieur: 613-990-1617
Courriel: scmo@scmo.ca

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Homepage: www.CMOS.ca Page d'accueil: www.SCMO.ca

THE CMOS - WEATHER RESEARCH HOUSE NSERC SCHOLARSHIP SUPPLEMENT

The CMOS - Weather Research House Scholarship Supplement was established in 1997 by Dr. Neil Campbell, then Executive Director of CMOS and Dr. Ambury Stuart, President of Weather Research House and founding Chair of the CMOS Private Sector Committee to recognise the best student in Meteorology or Oceanography who had won an NSERC Postgraduate Scholarship in the year of the award. The scholarship supplement is valued at $10,000 over a two-year period and is funded equally by CMOS and Weather Research House. By making this award, CMOS hopes that individual members of CMOS and other private sector companies will be encouraged to establish similar awards to support graduate students in meteorology or oceanography.

Only those students who have succeeded in winning an NSERC Postgraduate Scholarship or a Canada Graduate Scholarship are eligible. An initial award of $5,000 is renewable for a second year provided that the student continues to hold the NSERC postgraduate scholarship.

The winning student will be selected by a committee of the Society made up of representatives of the CMOS Scientific Committee and the CMOS Private Sector Committee. The scholarship supplement will be announced and presented at the CMOS annual Congress.

More information and instructions on how to apply may be found at: www.nserc.ca/sf_e.asp?nav=sfnav&lbi=2b_4

Applications must be sent to arrive by **15 April** to:

Executive Director CMOS
PO BOX 3211 STN D
OTTAWA ON K1P 6H7
Fax: 613-990-1617
Email: cmos@cmos.ca

LE SUPPLÉMENT SCMO - WEATHER RESEARCH HOUSE AUX BOURSES CRSNG

Le supplément SCMO-Weather Research House a été établi en 1997 par le docteur Neil Campbell, directeur exécutif de la SCMO à l'époque et le docteur Ambury Stuart, président de Weather Research House et président-fondateur du comité SCMO pour le secteur privé, afin de reconnaître le meilleur étudiant en météorologie ou océanographie titulaire d'une bourse d'études supérieures du CRSNG dans l'année du supplément. Le supplément peut attendre 10 000 $ si détenu pour une période de deux ans. Il est financé également par la SCMO et Weather Research House. En établissant ce prix, la SCMO espère d'encourager d'autres membres ou compagnies privées à établir de prix semblables pour les étudiants en études supérieures en météorologie ou océanographie.

Seulement les gagnants d'une bourse d'études supérieures (ÉS) du CRSNG ou d'une bourse ÉS du Canada sont admissibles à présenter une demande. Un supplément initial de 5 000 $ peut être renouvelé pour une deuxième année à la condition que l'étudiant continue à détenir une bourse ÉS du CRSNG ou une bourse ÉS du Canada.

Un comité de membres choisis des comités scientifique et du secteur privé de la SCMO évaluera les demandes et recommandera le candidat jugé le plus qualifié. L'annonce et la présentation du supplément seront fait au congrès annuel de la SCMO.

Pour de plus amples informations et des instructions comment présenter une demande vous devez visiter www.crsng.gc.ca/sf_f.asp?nav=sfnav&lbi=2b_4.

Les demandes doivent parvenir au plus tard le **15 avril** à :

Le directeur exécutif de la SCMO
C.P. 3211 Succursale D
Ottawa, ON, K1P 6H7
Télécopieur: 613-990-1617
Courriel: scmo@scmo.ca

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Homepage: www.CMOS.ca Page d'accueil: www.SCMO.ca

THE CMOS – CNC/SCOR NSERC SCHOLARSHIP SUPPLEMENT

The Canadian National Committee (CNC) for the Scientific Committee on Oceanic Research (SCOR), in partnership with DFO and CMOS, invites applications for the NSERC Scholarship Supplement for Ocean Sciences in the amount of $5,000/year for a period of two years. Only those students who have succeeded in winning an NSERC Postgraduate Scholarship or a Canada Graduate Scholarship are eligible. The initial award of $5,000 is renewable for the second year provided that the student continues to hold the NSERC postgraduate scholarship.

In establishing the Scholarship Supplement, CNC/SCOR intends to use already established mechanisms to solicit applications through NSERC and use adjudication procedures established through CMOS. The winning student will be selected by representatives of the CMOS Scientific Committee. The Supplement will be awarded at the annual banquet of the CMOS Congress. By using the well established NSERC and CMOS solicitation and adjudication procedures, CNC/SCOR will ensure that administrative overhead will on the one hand remain within the overall comfort level of the academic community, and on the other, will be fair, rigorous and transparent.

More information and instructions on how to apply may be found at: www.nserc.ca/sf_e.asp?nav=sfnav&lbi=2b_4

Applications must be sent to arrive by **15 April** to:

Executive Director CMOS
PO BOX 3211 STN D
OTTAWA ON K1P 6H7
Fax: 613-990-1617
Email: cmos@cmos.ca

LE SUPPLÉMENT SCMO – CNC/SCOR AUX BOURSES CRSNG

Le Comité national canadien (CNC) pour le Comité scientifique pour les recherches océaniques (SCOR), en partenariat avec le MPO et la SCMO, invite des applications pour un Supplément à la bourse du CRSNG pour les sciences de la mer, d'un montant de 5 000 $ par année, à un étudiant méritant pour une période de deux ans. Seuls sont éligibles les étudiants ayant remporté une bourse d'études supérieures du CRSNG ou une bourse d'études supérieures du Canada. Le Supplément initial de 5 000 $ est renouvelable pour la seconde année à condition que l'étudiant continue de détenir la bourse d'études supérieures du CRSNG

Pour décerner le Supplément à une bourse, le CNC/SCOR a l'intention d'utiliser les mécanismes déjà en place pour solliciter des candidatures par l'entremise du CRSNG et d'utiliser les modalités d'adjudication établies à la SCMO. L'étudiant gagnant sera choisi par des représentants du Comité scientifique de la SCMO. Le Supplément sera accordé lors du banquet annuel du Congrès de la SCMO. En utilisant les modalités de sollicitation et d'adjudication bien établies du CRSNG et de la SCMO, le CNC/SCOR s'assurera que l'administration générale, d'une part, restera dans la zone de confort du milieu de l'enseignement et, d'autre part, sera juste, rigoureuse et transparente.

Pour de plus amples informations et des instructions comment présenter une demande vous devez visiter www.crsng.gc.ca/sf_f.asp?nav=sfnav&lbi=2b_4.

Les demandes doivent parvenir au plus tard le **15 avril** à :

Le directeur exécutif de la SCMO
C.P. 3211 Succursale D
Ottawa, ON, K1P 6H7
Télécopieur: 613-990-1617
Courriel: scmo@scmo.ca

MAJOR CHANGES FOR *A-O* ONLINE

ATMOSPHERE-OCEAN has been available online in various formats since 1999. During these last eight years there have been dramatic developments in the field of online publications, and it is time for A-O to catch up. Starting in April 2007, A-O online (ISSN 1480-9214) will be post processed and hosted by a professional company MetaPress (www.metapress.com, a subsidiary of EBSCO).

The following features will be implemented:
A new Readers page, with the look and feel of a normal CMOS web page, showing bibliographic header information and abstract, as well as elaborate search facilities, ability to personalize the page and save search keywords, ability to save the bibliographic information as a formatted reference that can by copied into another document, information on the number of times the paper was cited, links to citing papers(forward referencing), ability to purchase a pay-per-view copy, ability to register for publication alerts, etc.

Each A-O article will be assigned a permanent Digital Object Identifier, and the primary URL location for this DOI will be maintained by an international organization (CrossRef). The references at the end of each article will have active links to the reference itself (if the DOI exists). Articles as far back as 2001 will be reprocessed in this manner.

The bibliographic information and links for each article will be distributed to a number of aggregating agencies and information distributors so that a search in the archives of these third parties will easily find A-O articles and link to them. These third parties will include initially ISI Web of Science, EBSCO Host, J-Gate and Google. Other third parties may be added as we discover them.

CMOS will have access to an administrative account to allow us to define the type of access we allow our subscribers, the subscription fees, and a number of other details. One interesting piece of information that has been eluding us from the start will finally be accessible, namely statistics on the number and nature of accesses made by subscribers, and even on the number of searches.

Institutional subscribers will also have access to statistical information on the number and nature of accesses and searches by members of their institution.

There is a cost for these improvements, but we hope that our much improved presence on the web will lead to increased revenues. Therefore, we do not plan to change our revenue model in the immediate future, but will wait for a year or so to see our results. Even without these improvements, ATMOSPHERE-OCEAN is already a very reputable journal, with one of the highest Impact Factors

GRANDS CHANGEMENTS POUR *A-O* EN LIGNE

ATMOSPHERE-OCEAN est disponible en ligne depuis 1999, en divers formats. Durant ces derniers huit ans, il y a eu des changements impressionnants dans le domaine des publications en ligne, et il est temps qu'A-O rattrape les autres. Dès la mi-avril 2007, A-O en ligne (ISSN 1480-9214) sera retraité et hébergé par une compagnie d'édition électronique, MetaPress (www.metapress.com, une filiale de EBSCO).

Les services suivants seront offerts:
Une nouvelle page des lecteurs du même style que les pages normales de la SCMO, offrant l'information bibliographique et le résumé, de même que des moyens avancés de recherche, le pouvoir de personnaliser la page, de sauvegarder les mots-clés, de sauvegarder l'information bibliographique sous forme de citation prête à coller dans un autre document, les détails sur les citations déjà accordées incluant des liens au document dont vient la citation (citation source), l'achat à l'article, l'enregistrement aux alertes de publication, etc.

Chaque article se verra assigné un numéro d'identification d'objet numérique (DOI) permanent et l'adresse URL où se trouve cet objet sera archivée par une organisation internationale (CrossRef). Les citations à la fin de chaque article seront pourvues de liens activés vers la référence elle-même (si un DOI existe). Les articles datant depuis 2001 seront ainsi retraités.

L'information bibliographique ainsi que les liens vers chaque article seront distribués à des agences rassembleuses et distributrices d'information de telle sorte q'une recherche dans les catalogues de ces tierces parties trouvera facilement les articles de A-O et fournira le lien direct. Ces tierces parties incluront initialement ISI Web of Science, EBSCO Host, J-Gate et Google. D'autres parties seront ajoutées à mesure que nous les découvrons.

La SCMO aura accès à un dossier administratif nous permettant de spécifier le type d'accès autorisé pour les abonnés, les frais d'abonnement, et nombre d'autres détails. Un détail qui nous intéresse depuis le début mais que nous n'avons jamais pu obtenir sera finalement disponible, nommément les statistiques sur le nombre et la nature des accès exécutés par les abonnés, et même le nombre de recherches.

Les abonnés institutionnels auront aussi accès aux statistiques sur le nombre et la nature des accès exécutés par leurs membres.

Il y a un coût pour ces améliorations, mais nous espérons que notre présence accrue sur le web amènera des augmentations de revenus. Donc, nous ne prévoyons pas de changement à notre modèle de frais pour l'immédiat; nous attendrons de voir les résultats. Même sans ces améliorations, ATMOSPHERE-OCEAN a déjà une

among all Canadian journals, and well up the list of Atmospheric Science and Oceanography journals internationally. We need to keep it there, so

AUTHORS, GET READY TO SUBMIT YOUR NEXT MANUSCRIPT!

Richard Asselin
Director of Publications (publications@cmos.ca)

réputation enviable, ayant un des facteurs d'impact les plus élevés parmi toutes les revues scientifiques canadiennes, et aussi un bon classement parmi les revues de sciences atmosphériques et océaniques internationales. Nous devons maintenir ce classement, donc

AUTEURS, PRÉPAREZ-VOUS À SOUMETTRE VOTRE PROCHAIN MANUSCRIT!

Richard Asselin
Directeur des publications (publications@scmo.ca)

Proposal from CMOS Council to Raise CMOS Membership Fees in 2008

CMOS membership fees were last raised in 2002, when the fee for regular members was raised from $45 to $60, an increase of 33%. They had been at $45 for the previous six years. Given that fee increases must be approved by members at an AGM, the earliest that another increase can be implemented is 2008, six years after the previous increase. Increases from time to time in order to cover both inflation and new programs are inevitable. This is true even when opportunities to achieve savings in program delivery are taken advantage of when available. Such increases, if left too long, build up to levels that are difficult for the membership to accept, so it is probably better to make more frequent small increases rather than infrequent large ones. On the other hand, increases every year create an unnecessary administrative burden because of the need to revise and reprint forms, etc. A reasonable interval would be three or four years. As will be argued below, we are already at the point where the cost of serving members has gone up at a rate much higher than inflation (about 2.15% per year averaged over the past six years, or $8 per member), so it is time to consider another fee increase.

The cost of serving the CMOS membership

The costs of serving the CMOS membership, both in terms of specific membership benefits such as the *CMOS Bulletin SCMO*, as well as the cost of running a basic infrastructure to provide membership services are shown in Table 1.

These costs, $98 per member are $38 more than the current fee of $60 charged regular members. Membership fees currently generate about $50K, about $30K short of covering these costs.

Table 1:
Annual Cost of servicing the CMOS membership

	Cost to CMOS	Cost per member
Bulletin	$22,000	$28
Annual Review	$2,500	$3
Secure web site	$8,000	$10
Database	$8,000	$10
Office overhead	$20,000	$25
Exec. Director	$18,000	$23
Total	**$78,500**	**$98**

In 2002, the CAP charges for running the CMOS business office were $24K, at about the same level they had been for many years. As a result of a failure to cover their own costs and to keep up with inflation, they suddenly requested an increase to $48K. Instead, we took over these functions in-house and are now spending $36K, the three middle items in the table, which is $12K more than these services cost us in 2002. This is much higher than the rate of inflation, but CMOS now has full control of its membership database and a secure web site for doing many additional things that were not possible in 2002.

Since 2004 CMOS has paid its executive director, which adds an additional cost of $18K. If membership fees were the only source of revenue they would have to supply an additional $(12K+18K) = $30K to cover increased costs, or $38 per member, which would raise fees to $98. This is the same as the total cost calculated by another approach as shown in the table, which suggests that in 2002 the $60 fee was just covering the cost of providing membership benefits. We should be aiming to continue to roughly cover these costs.

Provision for CMOS to hire a Communications Officer
The CMOS Strategic Planning Committee recommended and Council accepted that CMOS should hire a communications officer in order to help raise the public profile of the Society, as recommended by the AGM 2006. The estimated cost for someone to work on average two days a week would be about $10K.

The fee increase proposal
In order to cover both the increase in costs and to provide for a new communications officer we need an additional $40K in revenue or $50 per member. Some might argue that fees should increase only by the amount of inflation ($8 per member). This would not cover actual cost increases let alone the additional cost of a communications officer. However, an increase of $50 is almost certainly too much to be acceptable.

The last fee increase was 33% and it was difficult for the membership to accept. A 33% increase this time would cost $20 per regular member and generate an additional $16K in revenue, leaving a shortfall of $34K to be made up from other sources. Recent large congress surpluses have been covering these shortfalls to date. An increase of $20 would be sufficient to cover slightly more than half the actual current shortfall but less than half of the amount needed to cover that plus provide for a new communications officer.

Council recommends that a fee increase of at least $20 be approved by the AGM in 2007. Such an increase is urgently needed even if we do not succeed in hiring a communications officer. Council also recommends that a similar increase will be needed in three years' time in order to bring membership fees into closer alignment with actual costs.

Implementation
Table 2 shows the proposed new fee structure and revenue generated for various types of membership:

Table 2: Membership Fees		**Canada**		**USA**		**Other**		**Current Revenue**	**Proposed Revenue**
Current	**Proposed**	$	#	$	#	$	#		
$60	**Regular**	$80	535	$95	33	$120	11	$35,675	$47,139
$30	**Student**	$40	77	$55	3	$80	0	$2,445	$3,237
$250	**Corporate**	$333	14	$368	13	$428	0	$7,205	$9,433
$170	**Sustaining**	$226	0	$241	2	$241	0	$370	$482
$40	**Associate**	$53	2	$68	0	$93	0	$80	$106
$40	**Retired**	$53	104	$68	1	$93	0	$4,215	$5,601
	795		732		52		11	$49,990	$65,998

Proposition du Conseil de la SCMO pour augmenter les frais d'adhésion en 2008

Les dernières augmentations concernant les frais d'adhésion à la SCMO ont eu lieu en 2002, alors que les frais d'adhésion pour les membres réguliers étaient passés de 45$ à 60$, une augmentation de 33 %. Ces frais étaient de 45$ durant les six années précédentes. Compte tenu que les augmentations doivent être approuvées par les membres lors d'une AGA, la prochaine implantation d'une augmentation sera en 2008, six ans après la précédente augmentation. Des augmentations périodiques pour couvrir l'inflation et les nouveaux programmes sont inévitables. Cela est vrai même quand on profite des possibilités d'économies dans l'exécution des programmes, lorsque disponibles. De telles augmentations, si trop longtemps repoussées, s'élèveront à des montants difficiles à accepter pour les membres. Ainsi, il est probablement préférable de procéder à de plus fréquentes et à de moindres augmentations plutôt que d'opter pour des augmentations moins fréquentes et, par conséquent, plus élevées. D'autre part, des augmentations annuelles créent un fardeau administratif inutile à cause de la nécessité de réviser et de réimprimer les formulaires, etc. Un intervalle raisonnable serait de trois ou quatre ans. Comme il sera discuté ci-après, nous avons déjà atteint un taux beaucoup plus élevé que l'inflation en ce qui concerne les services aux membres (environ 2,15% par année en moyenne durant les six dernières années, ou 8$ par membre). Il est donc temps de considérer une autre augmentation des frais d'adhésion.

Le coût des services aux membres de la SCMO
Les coûts des services aux membres de la SCMO, en termes d'avantages spécifiques aux membres comme, par exemple, le Bulletin de la SCMO, ainsi que les coûts d'opération de l'infrastructure de base permettant de fournir les services aux membres sont présentés dans le tableau 1.

Tableau 1:
Coût annuel des services aux membres de la SCMO

	Coût pour la SCMO	Coût par membre
Bulletin	22 000$	28$
Revue annuelle	2 500$	3$
Site Internet sécurisé	8 000$	10$
Base de données	8 000$	10$
Frais généraux	20 000$	25$
Directeur exécutif	18 000$	23$
Total	**78 500$**	**98$**

Ces coûts de 98$ par membre sont de 38$ plus élevés que les frais d'adhésion actuels de 60$ chargés aux membres réguliers. Les frais d'adhésion génèrent présentement environ 50 000$, ce qui représente un manque à gagner d'environ 30 000$ pour couvrir les coûts.

En 2002, les charges à payer (CAP) pour opérer le bureau d'affaires de la SCMO étaient de 24 000 $. Cela représentait leur niveau approximatif pendant plusieurs années. En raison d'une incapacité de couvrir leurs propres coûts et de suivre l'inflation, CAP a soudainement demandé une augmentation de 48 000$. Au lieu de cela, nous avons pris le contrôle de ces fonctions au niveau interne et dépensons maintenant 36 000$ - les trois articles au centre du tableau – ce qui représente 12 000$ de plus que ce que ces services nous coûtaient en 2002. Ceci est beaucoup plus élevé que le taux d'inflation, mais la SCMO a maintenant le plein contrôle de la base de données de ses membres et un site Internet sécurisé pour faire plusieurs choses qu'il était impossible de faire en 2002.

Depuis 2004 la SCMO a donné un salaire à son directeur exécutif, ce qui constitue un coût additionnel de 18 000$. Si les frais d'adhésion étaient la seule source de revenu, ils devraient fournir un montant additionnel de (12 000$ + 18 000$) = 30 000$ afin de couvrir l'augmentation des coûts, ou 38 $ par membre, ce qui augmenterait les frais d'adhésion à 98$. Cela est le même résultat que le coût total calculé par une autre approche tel que présenté dans le tableau, laquelle suggère qu'en 2002, les frais d'adhésion de 60$ couvraient seulement le coût des avantages offerts aux membres. Nous devrions continuer de chercher à couvrir approximativement nos coûts.

Planification de la SCMO pour engager un agent de communications
Le comité spécial de planification stratégique de la SCMO a recommandé - et le conseil a accepté - que la SCMO engage un agent de communications afin d'aider le développement du profil public de la société, tel que recommandé par l'AGA 2006. Le coût estimé pour le travail d'une personne travaillant en moyenne deux jours par semaine serait d'environ 10 000$.

Proposition d'augmentation des frais d'adhésion
Afin de couvrir l'augmentation des coûts et de payer le salaire d'un nouvel agent de communications, nous avons besoin d'un montant additionnel de 40 000$ en revenus équivalant à 50$ par membre. Certains pourraient alléguer que les frais d'adhésion devraient augmenter seulement d'un montant équivalent à l'inflation (8$ par membre). Ceci ne couvrirait pas les augmentations actuelles des coûts, surtout pas le coût d'un agent de communications. Cependant, une augmentation de 50$ est certainement trop élevée pour être acceptable.

La dernière augmentation des frais d'adhésion était de 33% et elle a été difficile à faire accepter par les membres. Cette fois, une augmentation de 33 % coûterait 20$ par membre régulier et générerait un montant additionnel de 16 000$ en revenus, laissant un manque à gagner de 34 000$ devant être suppléé par d'autres sources. De larges surplus provenant de congrès récents ont couvert, jusqu'à ce jour, ces manques à gagner. Une augmentation de 20$ serait suffisante pour couvrir un peu plus de la moitié du manque à gagner actuel mais moins de la moitié du montant nécessaire pour couvrir ce manque et le salaire d'un nouvel agent de communications.

Le conseil recommande qu'une augmentation des frais d'adhésion d'au moins 20$ soit approuvée par l'AGA en 2007. Une telle augmentation est nécessaire, et ce, de façon urgente, même si nous ne réussissons pas à engager un agent de communications. Le conseil recommande également une augmentation similaire dans trois ans afin d'aligner adéquatement les frais d'adhésion des membres avec les coûts actuels.

Implantation
Le tableau 2. présente la nouvelle structure de frais d'adhésion proposée et les revenus générés pour les divers types de membres:

Table 2: Frais d'adhésion des membres		Canada		É.-U.		Autre		Revenus actuels	Revenus proposés
Actuels	**Proposés**	$	#	$	#	$	#		
$60	**Régulier**	80$	535	95$	33	120$	11	35 675$	47 139$
$30	**Étudiant**	40$	77	55$	3	80$	0	2 445$	3 237$
$250	**Corporatif**	333$	14	368$	13	428$	0	7 205$	9 433$
$170	**De soutien**	226$	0	241$	2	241$	0	370$	482$
$40	**Associé**	53$	2	68$	0	93$	0	80$	106$
$40	**Retraité**	53$	104	68$	1	93$	0	4 215$	5 601
	795		732		52		11	49 990$	65 998$

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

Amendements proposés pour la Constitution et Règlements de la SCMO

RÈGLEMENT 2 - Cotisation annuelle et frais d'abonnement
d) À moins d'avis contraire, les demandes d'adhésion ou de renouvellement reçues après le 1er ~~octobre~~ septembre seront considérées pour l'année suivante.

RÈGLEMENT 10 - Membres désignés du bureau <u>et du conseil</u>

RÈGLEMENT 11 - Renvoi des membres du bureau <u>et du conseil</u>
Les membres <u>du bureau et du conseil</u> de la Société, comprenant le président(e) et les membres des conseils de rédaction, les présidents et les membres des Centres et des groupes d'intérêts spéciaux, peuvent être renvoyés pour juste cause si une majorité formée des deux tiers des votants présents est obtenue au cours d'une réunion dûment convoquée par l'organe qui les a élus ou désignés, après que le membre en question ait eu l'occasion d'exprimer ses opinions.

RÈGLEMENT 12 - Rémunération des membres du bureau <u>et du conseil</u>
a) À l'exception du directeur exécutif, ~~du directeur des publications SCMO~~ du président(e) et des membres du comité d'accréditation, tous les autres membres <u>du conseil d'administration de la Société, incluant</u> le président(e) et les membres des autres comités et du conseil de rédaction, et le président(e) et les membres des Centres et des groupes d'intérêts spéciaux, ne sont pas rémunérés pour leurs fonctions, mais sont remboursés pour toutes dépenses approuvées par le bureau d'administration et encourues pour la Société.
b) ~~En plus du remboursement des dépenses approuvées par le bureau d'administration et encourues pour la Société,~~ Le conseil d'administration fixera de temps à autre la rémunération du directeur exécutif et ~~le directeur des publications SCMO et~~ déterminera les modalités de remboursement ~~de leurs~~ <u>des</u> dépenses approuvées par le bureau d'administration et encourues pour la Société.

<u>Avis:</u> Les mots soulignés sont des mots ajoutés aux règlements.

RÈGLEMENT 18 - Emprunts

Le Conseil peut, de temps à autre:

a) emprunter des sommes d'argent ou obtenir autrement du crédit sur le crédit de la Société, selon des montants et modalités jugés appropriés;

b) émettre, réémettre, vendre ou nantir des obligations de dettes de la Société, y compris, sans pour autant s'y limiter, des obligations, des débentures, des débentures convertibles en actions, des billets, ou autre valeurs mobilières ou obligations de la Société, garanties ou non pour tels montants, selon les modalités et engagements et selon les prix qui sont considérés opportuns;

c) imposer, hypothéquer, nantir, céder, virer ou autrement offrir une garantie sur tout bien réel ou personnel, meuble ou immeuble appartenant présentement ou subséquemment acquis par la Société, y compris, entre autres choses, les comptes débiteurs et commandes impayées, droits, pouvoirs, franchises et engagements, pour garantir toute somme empruntée ou toute autre dette ou toute responsabilité de la Société;

d) garantir à la Banque Canadienne Impériale de Commerce («CIBC») l'endettement et la responsabilité de toute personne, entreprise ou société, pour un montant limité ou illimité, et avec ou sans garantie; et

e) déléguer à tout dirigeant ou administrateur de la Société, désigné par le Conseil, tout pouvoir conféré par les dispositions précédentes du règlement dans la mesure où et de la manière que Conseil le déterminera dans le cas de chaque délégation.

Avis: Les mots soulignés sont des mots ajoutés aux règlements

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

APPENDICE II AUX RÈGLEMENTS FONCTIONS DES MEMBRES ÉLUS

ET DÉSIGNÉS DE LA SOCIÉTÉ

1. Les fonctions du bureau d'administration sont :

c) **Le trésorier**

viii) Le trésorier doit effectuer d'autres tâches financières au nom de la Société~~, comme l'initiation d'octroi de subventions aux Centres, la rédaction de contrats et autres tâches~~ telles que requises de temps à autres.

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 designer un directeur des publications, un chef de bureau ou autres personnes requises et décider de leurs fonctions et de leurs rémunérations.

Avis: Les mots soulignés sont des mots ajoutés aux règlements.

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

Proposed amendments to the CMOS Constitution and By-Laws

BY-LAW 2 - Annual Membership and Subscription Fees.
d) Membership applications received after ~~October~~ September 1 are presumed to be for the following year, unless otherwise indicated.

BY-LAW 12 - Remuneration of Officers
a) Except for the Executive Director~~, the Director CMOS Publications~~ and the Chairperson and members of the Accreditation Committee, all other Officers of the Society, including the Chairpersons and members of all other Committees and of Editorial Boards, and the Chairpersons and other Officers of Centres and Special Interest Groups, shall not be remunerated for their services, but they may be reimbursed for expenses, incurred on behalf of the Society, and approved by the Executive.
b) Council will from time to time determine ~~a suitable honorarium for~~ the remuneration of the Executive Director ~~and the Director CMOS Publications~~ and make regulations concerning the reimbursement for ~~those~~ expenses incurred on behalf of the Society and approved by the Executive.

BY-LAW 18 – Borrowing
The Council may from time to time:
a) borrow money or otherwise obtain credit upon the credit of the Society in such amounts and upon such terms as may be considered advisable;
b) issue, reissue, sell or pledge debt obligations of the Society, including without limitation, bonds, debentures, debenture stock, notes or other securities or obligations of the Society, whether secured or unsecured for such sums, upon such terms, covenants and conditions and at such prices as may be deemed expedient;
c) charge, mortgage, hypothecate, pledge, assign, transfer or otherwise create a security interest in all or any currently owned or subsequently acquired real or personal, movable or immovable property of the Society, including among other things, book debts and unpaid calls, rights, powers, franchises and undertaking, to secure any money borrowed or any other debt or liability of the Society;
d) guarantee to Canadian Imperial Bank of Commerce ("CIBC") the indebtedness and liability of any person, firm or corporation, in either a limited or unlimited amount and with or without security; and
e) delegate to such one or more of the officers and directors of the Society as may be designated by the Council all or any of the powers conferred by the foregoing clauses of the by-law to such extent and in such manner as the Council shall determine at the time of each delegation.

APPENDIX II TO BY-LAWS, DUTIES OF ELECTED AND APPOINTED OFFICERS OF THE SOCIETY
1. The duties of the Executive shall be:
c) **The Treasurer**
viii) The Treasurer shall carry out other financial functions for the Society ~~such as originating subventions for Centres, drawing up contracts, and such other functions~~ as may become necessary from time to time.
f) **Councillors-at-large**
iii) undertake special studies or ~~analysis~~ 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 and remuneration of a Director of Publications, an Office Manager and others as needed, subject to the approval of Council

CURRENT CMOS POLICIES AND POSITION STATEMENTS
m) **Science ~~Policy~~ Position Statements**
- ~~Policy~~ Position Statement on Weather Modification
- ~~Policy~~ Position Statement on Climate Change
- ~~Policy~~ Position Statement on Natural Hazards
- ~~Policy~~ Position Statement on the Kyoto Protocol

Note: Underlined words are new words added to the original By-Laws.

Report of the Nominating Committee

Proposed Slate CMOS 2007-2008

The nominating committee this year consisted of Susan Woodbury (Chairperson), Max Dupilka, Joe Eley and Neil Campbell. We are please to report that the following people have agreed to let their names stand for election to the CMOS Executive for 2007-2008.

Rapport du Comité de mise en candidature

Proposition du Conseil de la SCMO pour 2007-2008

Le comité de mise en candidature était formé cette année de Susan Woodbury (Présidente), Max Dupilka, Joe Eley et Neil Campbell. Nous sommes heureux d'annoncer que les personnes suivantes ont accepté que leur nom soit mis en candidature pour l'élection de l'Exécutif de la SCMO pour 2007-2008.

President Président	**Paul Myers**	Oceanographer, EAS, University of Alberta Océanographe, EAS, Université d'Alberta Edmonton, AB
Vice-President Vice-président	**Andrew Bush**	Climatologist, EAS, University of Alberta Climatologue, EAS, Université d'Alberta
Treasurer Trésorier	**Ron Hopkinson**	Meteorological consultant, Consultant en météorologie Custom Climate Services, Regina, SK
Corresponding-secretary Secrétaire-correspondant	**Bob Kochtubajda**	Meteorologist, Environment Canada Météorologue, Environnement Canada Edmonton, AB
Recording Secretary Secrétaire d'assemblée	**Bill Hume**	Retired meteorologist Météorologue à la retraite, Edmonton, AB
Past-President Président d'office	**Geoff Strong**	Meteorological consultant Consultant en météorologie Ardrossan, AB
Councillors-at-large Conseillers	**1) Neil Campbell** **2) Kent Johnson** **3) Brad Shannon**	1) Retired oceanographer Océanographe à la retraite Ottawa, ON 2) Manager, NSO - Natural Resources, Environment Canada Gestionnaire, BNS - Ressources naturelles, Environnement Canada, Kelowna, BC 3) Warning Preparedness Meteorologist, Environment Canada Météorologue, Préparation pour avertissement, Environnement Canada, Calgary, AB

Susan Woodbury, ACM, FCMOS,
Past-President

Susan Woodbury, ACMC, FCMOS,
Présidente d'office

CMOS-CGU-AMS 2007 / SCMO-UGC-AMS 2007

Air, Ocean, Earth and Ice on the Rock

May 28 - June 1 2007

Call for Papers

CMOS-CGU-AMS Congress 2007
St. John's, Newfoundland, Canada
May 28 – June 1 2007

The Canadian Meteorological and Oceanographic Society (CMOS), the Canadian Geophysical Union (CGU), the American Meteorological Society (AMS) [Polar Meteorology and Oceanography, Climate Variability, Air-Sea Interactions Committees] Congress 2007 together with the Eastern Snow Conference (ESC) will be held at the St. John's Convention Centre and Delta Hotel in Newfoundland Canada from May 28 to June 1, 2007.

The Congress theme "*Air, Ocean, Earth and Ice on the Rock*", along with the key objectives of the International Polar Year, reflect the Congress' objective to explore, link, bridge and integrate the scientific interests of the CMOS, CGU, AMS and ESC. For information on planned special and general science sessions, please visit the Congress web site at:

http://www.cmos2007.ca

The deadline for submission of abstracts is **February 15, 2007**. Abstracts should be submitted electronically in English or French on the Congress web site at http://www.cmos2007.ca. Abstracts should be no more then 300 words, with no figures.

For enquires on scientific sessions, please contact the co-chairs of the Scientific Program Committee Guoqi Han (CMOS) at HanG@dfo-mpo.gc.ca, Rod Blais (CGU) at blais@ucalgary.ca, or Taneil Uttal (AMS) at Taneil.Uttal@noaa.gov. For other information on the Congress visit http://www.cmos2007.ca or contact Local Arrangement Committee (LAC) Chair Fraser Davidson at DavidsonF@dfo-mpo.gc.ca.

Co-chairs, the Scientific Program Committee

- Guoqi Han (Fisheries and Oceans Canada, HanG@dfo-mpo.gc.ca, CMOS)
- Rod Blais (University of Calgary, blais@ucalgary.ca, CGU)
- Taneil Uttal (NOAA, Taneil.Uttal@noaa.gov, AMS)

CMOS-CGU-AMS 2007 / SCMO-UGC-AMS 2007

Air, océan, terre et glace sur le roc

28 mai - 1 juin 2007

Appel de Communications

Congrès SCMO-UGC-AMS 2007
St-Jean, Terre-Neuve, Canada
28 mai – 1 juin 2007

Le congrès 2007 de la Société canadienne de météorologie et d'océanographie (SCMO), de l'Union géophysique canadienne (UCG) et de l'American Meteorological Society (AMS) [comités de météorologie et d'océanographie polaire, de la variabilité du climat et des interactions air-mer], en partenariat avec le Eastern Snow Conference (ESC), sera tenu au St. John's Convention Centre et à l'hôtel Delta de Terre-Neuve, du 28 mai au 1er juin 2007.

Le thème du congrès "*Air, Océan, Terre et Glace sur le Roc*", ainsi que les objectifs de l'Année polaire internationale, reflètent l'objectif du congrès qui est d'explorer, d'échanger et d'intégrer les intérêts scientifiques de la SCMO, de l'UGC, de l'AMS et du ESC. Pour plus d'information sur les sessions spéciales et générales qui sont planifiées visitez le site du congrès à:

http://www.cmos2007.ca

La date limite pour soumettre un résumé est le **15 février, 2007.** Les résumés doivent être soumis électroniquement en anglais ou en français sur le site du congrès au http://www.cmos2007.ca. Les résumés doivent contenir moins de 300 mots et ne pas contenir de graphiques.

Pour plus d'information sur les sessions scientifiques, contactez les co-présidents du comité du programme scientifique : Guoqi Han (SCMO) à HanG@dfo-mpo.gc.ca, Rod Blais (UGC) à blais@ucalgary.ca, ou Taneil Uttal (AMS) à Taneil.Uttal@noaa.gov. Pour d'autres informations générales à propos du congrès visitez http://www.cmos2007.ca ou contactez le président du comité des arrangements locaux Fraser Davidson au DavidsonF@dfo-mpo.gc.ca.

Co-présidents du Comité du programme scientifique

- Guoqi Han (Pêches et Océans Canada, HanG@dfo-mpo.gc.ca, SCMO)
- Rod Blais (Université de Calgary, blais@ucalgary.ca, UGC)
- Taneil Uttal (NOAA, Taneil.Uttal@noaa.gov, AMS)

MSC Renews Collaborative Agreement with China

Delegates at the Joint Working Group meeting. The MSC and the China Meteorological Administration (CMA) renewed their Memorandum of Understanding (MOU) on Science and Technology at the 10th meeting of the Joint Working Group (JWG) in September, continuing a relationship that has been in effect for two decades.

The meeting, held at EC's Prairie and Northern Region offices in Edmonton, featured presentations by MSC and CMA experts and provided an opportunity for tours of the Stony Plain monitoring site, the Alberta River Flow Forecast Centre, and a local wind farm.

Over the next two years, the MSC and Environment Canada's Science and Technology Branch will collaborate with the CMA on more than a dozen projects related to health and safety, earth observations, climate change, sustainability, and senior management training.

The work plan for 2007-08, which was finalized at the meeting, focuses on issues that pose significant human-resource and financial challenges to the two organizations: challenges that can be met more effectively through the sharing of data, technologies, and expertise.

Some of the projects being undertaken include the following:

- efforts to improve the nowcasting and mesoscale ensemble forecasting of high-impact weather in preparation for the Olympic Games in Beijing and Vancouver;

- the sharing of emissions inventories and processing technologies to help expand the CMA's aerosol module to include sulphate, black carbon, organic carbon, and others;

- activities related to International Polar Year, including the exchange of data and studies on the state, fate, and impact of the cryosphere;

- efforts to improve the long-term observation of greenhouse gases, the carbon cycle, and stable isotopes at two atmospheric monitoring stations in China;

- the use of satellite remote-sensing to detect trace gases that affect the destruction of stratospheric ozone;

- research on climate change, including issues related to impacts and adaptation, changes in the probability of extreme events, modelling to estimate water availability, and the development of drought risk assessment and drought hazard early warning systems;

Dr. Qin, of the China Meteorological Administration, and Environment Canada's David Grimes after the signing of the MOU.

- cooperation to improve the integration of hazards into the wind energy science system in order to optimize modelling for sustainable wind-energy production and greenhouse-gas reductions;

- the MSC's hosting of a third senior-management internship program for eight Chinese meteorologists over the next two years.

The meeting closed with the signing of the MOU at a special ceremony in Calgary. The 11th meeting of the JWG will take place in China in 2008.

INTERNATIONAL 2007 2008 POLAR YEAR

Ice Experts Creating Web Site for IPY Research

The Canadian Ice Service and ice experts from most of the other countries in the northern hemisphere are collaborating to develop a common Web site for global ice information to support International Polar Year (IPY) research activities.

The site, which will host ice information products contributed by the various national ice services, will give IPY researchers fast and easy access to all of the sea ice and iceberg information available for any point on the globe — from ice charts to numerical model outputs.

Participants at the 7th meeting of the International Ice Charting Working Group

The initiative was launched at the 7th meeting of the International Ice Charting Working Group (IICWG), which was held in Helsinki, Finland, this fall. The IICWG is an ad-hoc working group that provides advice on ice services policy to the World WMO/IOC Joint Commission on Marine Meteorology and Oceanography and coordinates operational ice information services internationally. Its goal is to provide the best ice information possible to mariners worldwide.

IICWG members share best practices for ice analysis and forecasting, the use of satellite data, and the design of ice-chart production systems. In years past, the group has developed international standards for ice-chart colour codes and an encoding standard for archiving digital ice charts. It is now working to develop standards for the ice information in Electronic Chart Display and Information Systems, which are replacing paper charts as the navigation standard for ships.

The main objective of the new Web site will be to enhance the safety of IPY research activities being carried out on, in, or under the Arctic and Antarctic sea ice by hosting information in real-time and offering products designed specially for communication via narrow-bandwidth satellite phones. In addition, it will be useful for planning field activities and as a research reference.

To create the new site, the IICWG has partnered with PolarView, a satellite-data application demonstration project funded by the European Space Agency and managed by C-CORE of St. John's, Newfoundland. PolarView will provide the technical expertise to develop and manage the system.

The Web site will be in operation from March 2007 throughout the IPY period until at least 2009: if it proves valuable, it may continue on as an IPY legacy. For the IICWG and the international ice-charting community, the site could mark the start of a new level of international collaboration and form the embryo of a global ice-information service.

For more information, please contact: **John Falkingham**, at 613-996-4552.

McGill University announces a new Fellowship for graduate study in the Department of Atmospheric and Oceanic Sciences

The Stephen and Anastasia Mysak Graduate Fellowship was established in 2006 by Professor Lawrence A. Mysak in honour of his father, Stephen Mysak (born December 24, 1906), and in memory of his mother, Anastasia Mysak (1907-1978). The Fellowship's official launch came in a ceremony at McGill University, sponsored by the Dean of Science, and held at the Redpath Museum on 23 November, 2006. The Fellowship is to be awarded by the Graduate and Postdoctoral Studies Office upon recommendation of the Faculty of Science, to a full-time graduate student in the Department of Atmospheric and Oceanic Sciences. The Fellowship will be awarded on the basis of academic excellence, with preference given to students pursuing research in one or more fields of air-sea interaction, oceanography or climate. The estimated value of this fellowship is $15,000 per year, renewable once at the Master's level, and twice at the Doctoral level.

It is expected that the first recipient will be selected for the semester beginning in September 2007.

For further information concerning Graduate Admissions in the Department of Atmospheric and Oceanic Sciences, please contact the Department directly via email at graduateinfo.aos@mcgill.ca, by phone at 514-398-3764, or consult the departmental website at www.mcgill.ca/meteo.

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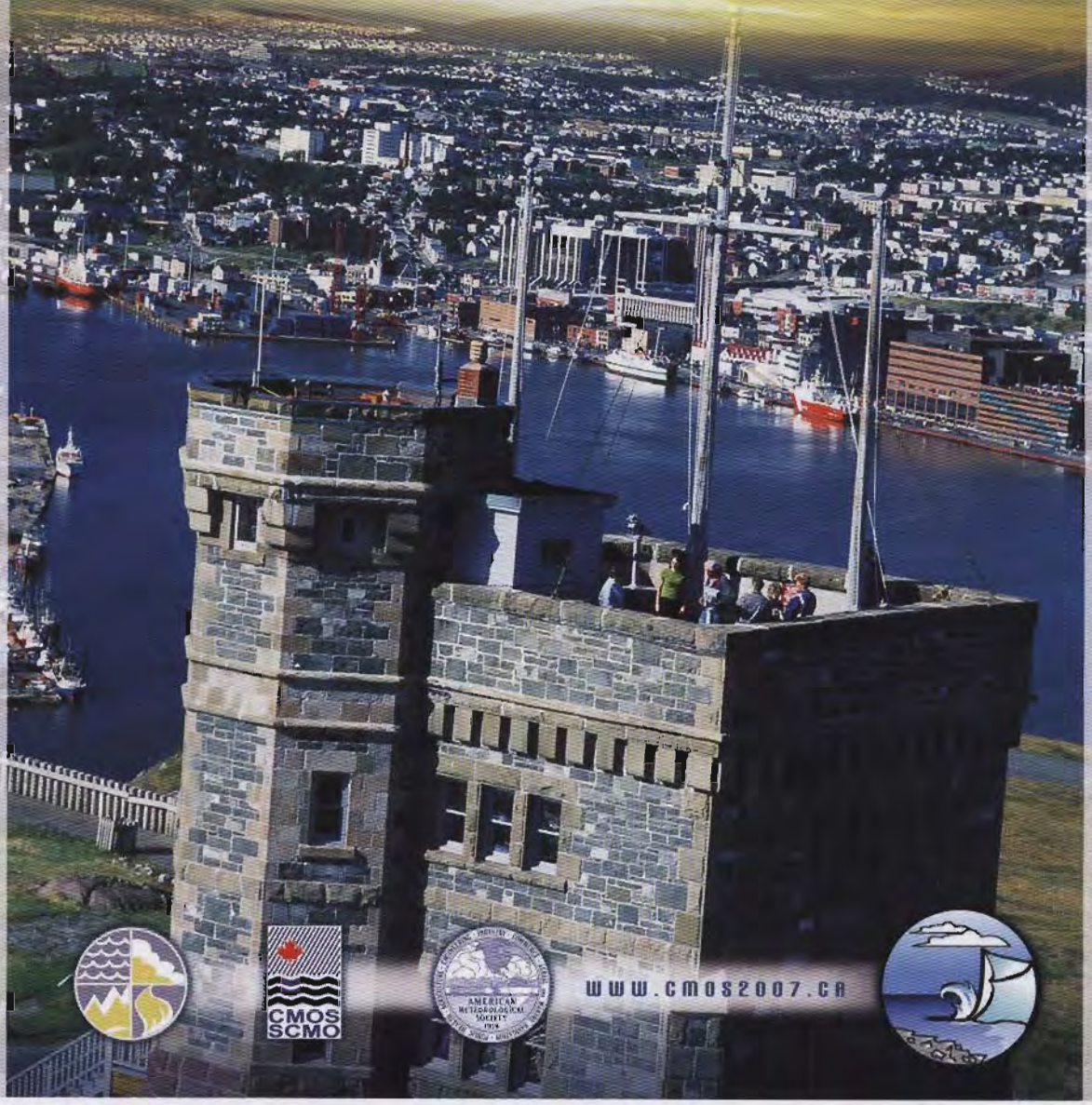
Air, Ocean, Earth and Ice on the Rock

MAY 28 TO JUNE 1, 2007 / 28 MAI AU 1 JUIN, 2007

Air, Océan, Terre et Glace sur le Roc

CMOS-CGU-AMS CONGRESS 2007

CONGRÈS SCMO-UGC-AMS 2007



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Find it.
trouvez-le
DATA IS EVERYWHERE
Capture it
capturez-le
LES DONNÉES SONT PARTOUT
Use it.
utilisez-le
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