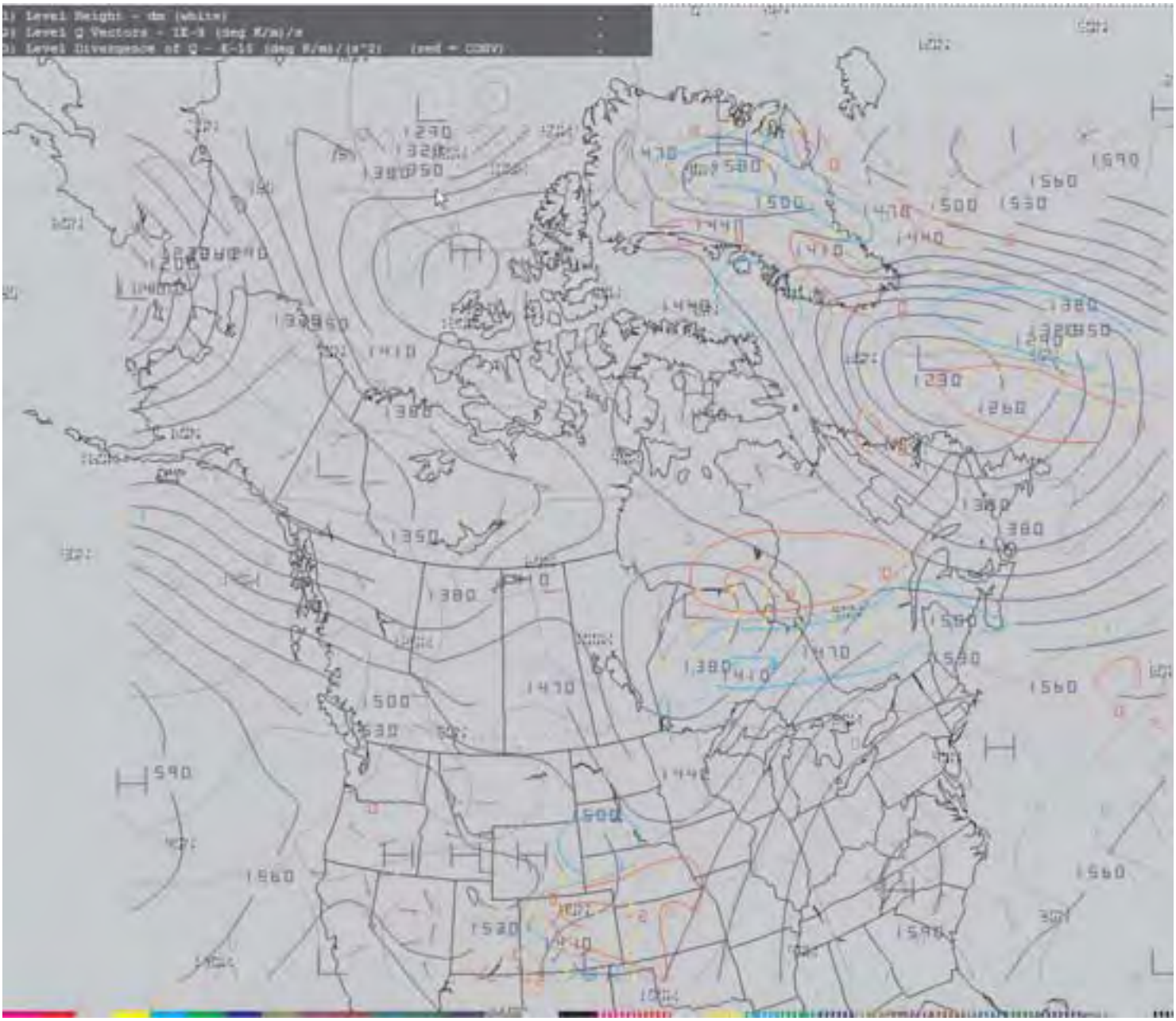
ISSN 1195-8898 .

CMOS BULLETIN SCMO

Canadian Meteorological and Oceanographic Society

La Société canadienne de météorologie et d'océanographie

October / octobre 2007 Vol.35 No.5



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

Editor / Rédacteur: Paul-André Bolduc
Canadian Meteorological and Oceanographic Society
Société canadienne de météorologie et d'océanographie
P.O. Box 3211, Station D
Ottawa, ON, Canada K1P 6H7
E-Mail: bulletin@cmos.ca; Courriel: bulletin@scmo.ca

Cover page : An image of Q-vectors and Q-vector divergence calculated from CMC regional 15-km GRIB1 data using PCGRIDDS32 or WINGRIDDS. PCGRIDDS32 and WINGRIDDS are two powerful (and free!) applications that make it easier than ever to display GRIB model data on your home, work or school personal computer (PC) packages come with about 1,700 command files called macros, like QVEC.CMD, which was used to produce this image. Read about how to get started with PCGRIDDS32 in the article on **page 153**.

Page couverture : Une image de vecteurs-Q et de divergence de vecteurs-Q calculés à partir des données GRIB1 du modèle régional du CMC au moyen de PCGRIDDS32 ou WINGRIDDS. PCCGRIDDS32 et WINGRIDDS sont deux applications puissantes (et gratuites!) qui rendent plus facile que jamais la visualisation des sorties GRIB de modèles sur votre ordinateur personnel (PC) à la maison, au travail, ou à l'école. Les ensembles incluent environ 1,700 fichiers de commandes appelés macros, tel que QVEC.CMD, qui a été utilisé pour produire cette image. Lisez comment débuter avec PCGRIDDS32 dans l'article en **page 153.**

CMOS Executive Office / Bureau de la SCMO

P.O. Box 3211, Station D
Ottawa, Ontario, Canada, K1P 6H7
Fax / Fascimilé: 613-990-1617
homepage: http://www.cmos.ca
page d'accueil: http://www.scmo.ca

Dr. Ian Rutherford
Executive Director - Directeur exécutif
Tel/Tél.: 613-990-0300
E-mail/Courriel: cmos@cmos.ca

Dr. Richard Asselin
Director of / Directeur des Publications
Tel/Tél.: 613-991-0151
E-mail/Courriel: publications@cmos.ca

Ms. Lise Harvey
Office Manager - Chef de bureau
Tel/Tél.: 613-991-4494
E-mail/Courriel: accounts@cmos.ca

Canadian Meteorological and Oceanographic Society (CMOS)

Société canadienne de météorologie et d'océanographie (SCMO)

....from the President's Desk

Friends and colleagues:

Dr. Paul Myers
CMOS President
Président de la SCMO

I hope everyone had a good summer, whether they are presently catching up on work that may have built up over the summer or started to teach/take courses with the beginning of the academic year. For those who like to plan ahead, the 2008 Congress will be in Kelowna. Preliminary information on this meeting is already available through the CMOS web page. The 2009 meeting will be in Halifax. And the executive is presently thinking about the 2010 congress – so if your Centre has not hosted a congress in a while, we would be open to offers from anywhere within the country. I should also mention that I am the second president as part of the Alberta executive and will be followed by Andy Bush. Since normally the executive moves every 3 years, we are also starting to seek out centres which are interested in hosting the executive beginning in 2009 and for members who are interested in getting involved in the executive in the future.

A few things of note that maybe not all members know. The Society has a small fund which contains money that can be used to support small scientific meetings in CMOS-related areas, especially if they involve students. Funds can be requested with a brief submission to the executive of the amount needed and the reason for the funds. We also can provide matching funds to support Centre donations to city-wide, regional and/or provincial science fairs. Again, a brief submission to the executive on the amount needed is all that is required. Since to broaden CMOS membership and keep it current we need a continual infusion of new people and blood, any other approach that would potentially increase CMOS' exposure, especially to students, would be something that the executive would be willing to consider supporting. Approach us and we'll see what we can do. Additionally, since most Centres run seminar series (at the very least involving the Tour Speaker), I would call on people to make sure these events are advertised in the local universities and colleges that have programs involving atmospheric or oceanic sciences (as well as more 'fundamental' disciplines such as physics and math that can provide a pool of people who might be interested in the application of their background to our field).

(Continued on page 142 / Suite à la page 142)

Volume 35 No.5
October 2007 — Octobre 2007

Inside / En Bref

Articles

Our regular sections / Nos chroniques régulières

Printed in Kanata, Ontario, by Gilmore Printing Services Inc.
Imprimé sous les presses de Gilmore Printing Services Inc., Kanata, Ontario.

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)

Quelques mots sur un sujet inconnu de la plupart des membres. La société possède des enveloppes budgétaires contenant des fonds qui peuvent être utilisés pour la tenue de petites réunions scientifiques dans les domaines reliés à la SCMO, particulièrement si ces réunions impliquent des étudiants. Ces fonds peuvent être demandés avec une brève description au directeur-exécutif tout en spécifiant le montant requis. Nous pouvons également égaler les fonds dépensés par les Centres pour les expos-sciences municipales, régionales ou provinciales. Également, une brève soumission au directeur-exécutif est tout ce qui est requis. Dans le but d'élargir l'adhésion des nouveaux membres au sein de la SCMO et de conserver les membres existants, nous avons besoin d'une continuelle infusion de nouveaux membres. Pour combler cette exigence, tout autre demande faite dans le but d'augmenter l'exposition de la SCMO, particulièrement aux étudiants, sera considérée favorablement par l'exécutif. Contactez-nous et nous verrons comment nous pourrons vous aider. De plus, puisque la plupart des centres tiennent des conférences (à tout le moins celle donnée par le conférencier itinérant de la SCMO), je demanderais que ces événements soient suffisamment annoncés dans les universités locales et les collèges qui ont des programmes d'études dans les sciences météorologiques et océanographiques (ainsi que les disciplines plus fondamentales que sont la physique et la mathématique qui peuvent fournir un bassin de personnes intéressées dans l'application de leur bagage scientifique dans nos champs d'activités respectifs).

Finally, CMOS received a request from the Atmospheric Science and Technology Directorate of Environment Canada (EC) for input with respect to their suggestion of the idea of a "Canadian UCAR (University Corporation for Atmospheric Research)". Additionally information on this item has been placed on the CMOS webpage at http://www.cmos.ca/whatsnew.html. However, CMOS has received very little feedback on this issue, and without feedback from the members, it is very hard for the executive to provide constructive comments. Therefore, if you have any thoughts or opinions on this issue, please pass them on to me or another member of the executive.

Paul Myers,
CMOS President
Président de la SCMO

Highlights of Recent CMOS Meetings

June - September 2007

June 20 – Executive Meeting: Issues covered included

- The take over of the new executive;
- A debrief of the St. John's congress;
- Discussion of publications, including the use of MetaPress to provide access to A-O, as well as a potential shortage of papers being submitted to A-O (so, in other words, if you have good work that you are trying to finish writing up, do so, and submit it to A-O), although several special issues are in the works for next year (2008);
- Update and planning for the 2008 Kelowna Congress, as well as discussion of some preliminary issues for the 2009 Halifax Congress;
- Discussion of whether another joint congress with CGU should be carried out in 2010, and if so, where.

September 10 – External Relations Committee.

This meeting basically focussed on one item, links with CGU and other like minded geophysical and/or environmentally focussed societies.

September 11 – Executive Meeting: Issues covered included:

- Updates on the 2008 Kelowna Congress planning;
- Discussion of a Tour Speaker for 2007/08, with names being decided on for approval at the next CMOS Council Meeting;
- Discussion of how to rejuvenate the School and Public Education Committee;
- Potential locations for the CMOS executive for the 2009-2011 period when it moves from its present Edmonton location;
- The fact that although we have approved the creation of a Communications Officer for the Society, we have yet to find an interested volunteer.

Stop the Press !

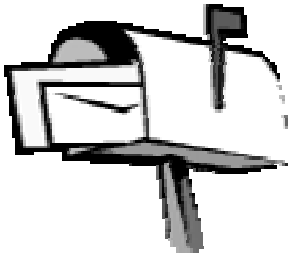
DFO Oceanographer wins the Massey Medal

For his leading role in ocean science, Eddy Carmack, a climate oceanographer with Fisheries and Oceans Canada in Sidney BC, has been awarded the 2007 Massey Medal for outstanding achievement in Canadian geography. Established by Governor General Vincent Massey in 1959, the award is administered by the Royal Canadian Geographic Society.

Letter to the Editor

Date: 14 September 2007

Subject: Climate Change and Local Communities



While climate change concerns are frequently in the news, many may wonder what can be done locally to help communities practise better planning strategies, reduce climate change risks and start adapting to climate change impacts. There is concern we must act in the next few decades to stabilize our greenhouse gas production, start adapting, and eventually, start reversing the trend in our emissions.

Last May (2007) my borough of Pierrefonds-Roxboro on the island of Montréal, held public consultations on proposed modifications to our urban plan. While reading the proposed changes, I noted there was very little in terms of substantive action with measurable targets to address the issue of climate change.

So I used the consultation opportunity to prepare a Powerpoint presentation in which I tried to make a case that our urban plan, which proposes to present a vision for the next 10 years, should now include much clearer climate change adaptation, risk management objectives, strategies and milestones. I offered the perspective that risk management information, presently absent in our urban plan, should be included in order to minimize exposure to climate change risks expected in the future. I am thankful to Francis Zwiers for providing valuable Climate Change impact information that I was able to use in the presentation. Interestingly, the urbanists of the Montréal Public Consultation Office, who were leading the public consultation, tended to agree with some of the points raised. In their final report, available at: http://www2.ville.montreal.qc.ca/ocpm/pdf/P18/Rapport.pdf (in French only) they made several recommendations in section 3.4. They recommended the borough include in the revised urban plan more meaningful objectives to demonstrate progress with respect to sustainable development (3.4.1) and to develop a longer term strategy to better prevent and manage risks associated with climate change (3.4.4).

We are eagerly awaiting the borough's response concerning their revised urban plan. We are not sure they are bound, at all, to the recommendations made by the public.

Similarly, this summer (2007), the city of Montréal held public consultations on their proposed transportation plan (http://ville.montreal.qc.ca/portal/page?_pageid=4577,7757563&_dad=portal&_schema=PORTAL) Again, after my reading the plan, I found there are not many measurable objectives and targets in the proposed plan. The city would like to act in the spirit of the Kyoto accord, while promoting a number of projects in a manner that make it difficult for the public to appreciate the environmental cost and benefit of each project.

As a result, I also took this opportunity to make a presentation offering suggestions to include significantly more climage change impacts, adaptation and risk management information in the transportation plan, to include a broad range of meteorological information as part of our transportation planning strategies and to develop a more objective method to present transportation projects that can better summarize and compare how each project helps us attain our environmental and financial objectives.

If other CMOS members would like to participate in their own local consultations to raise these important issues, I could gladly make my powerpoint presentations available as starting points for others to use and adapt to their local considerations as they see fit.

Lewis Poulin
Pierrefonds-Roxboro, Québec

Note: This email was sent as a personal email from the author to the Editor of the *CMOS Bulletin SCMO*. This email represents the personal views of the author and not necessarily the views of his employer nor of CMOS.

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Next Issue *CMOS Bulletin SCMO*

Next issue of the *CMOS Bulletin SCMO* will be published in **December 2007.** Please send your articles, notes, workshop reports or news items before **November 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 **décembre 2007.** Prière de nous faire parvenir avant le **2 novembre 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.

Impacts of Severe Arctic Storms and Climate Change on Arctic Oceanographic Processes

Reported by Will Perrie

This project, led by BIO's Ocean Sciences Division (OSD), has recently been initiated and funded as part of the International Polar Year (IPY). Its focus is to understand the effects of intense storms and severe Arctic weather on coastal regions. The locations that will be studied are the Southern Beaufort Sea and the Western Canadian Arctic.

Figure 1. Example of ocean surface waves.

Climate change influences storms and severe weather by altering the areas of open water and ice cover. Ocean surface flows modulate storm development, storm direction and marine winds. Increased open water in the Arctic affects Arctic weather. Scientific research in this IPY project will examine the following ocean processes: waves, storms, ocean currents, marine winds, erosion and sediment deposits.

Coastal land and water are vital to the people of Northern Canada. The coast is an important part of their daily lives and culture. Arctic storms have an effect on sediments, erosion, waves and surges. Changes that occur in these areas influence arctic lifestyle, aquatic species and resource development. Arctic storms seem to be growing in strength. Increased understanding of storms and patterns will provide information beneficial to Northerners.

This project is a collaboration between the Ocean Circulation Section (Will Perrie) and Coastal Ocean Sciences Section (Charles Tang) of OSD, and also with Natural Resources Canada (Steve Solomon) and McGill University (John Gyakum). A complementary PERD (Panel on Energy R&D) project led by Steve Solomon is mooring an array of instruments to collect wave and current data during summer storms off Tuktoyaktuk. Automatic meteorological data is available from a station on nearby Pelly Island maintained by MSC (Meteorological Service of Canada). Finally collaboration with the Institute of Ocean Sciences (H. Melling) is providing offshore measurements of waves and currents at a deep water position nearer to the shelf break.

Figure 2. Example of Arctic storm

Figure 3. Erosion hazard index for areas of the coast near Tuktoyaktuk.

Note: Original published in the August issue of the Canadian Ocean Science Newsletter (Vol.31). Reproduced here with the authorization of the author and the publisher.

"The Great Global Warming Swindle": A Critique[1]

by David Jones, Andrew Watkins, Karl Braganza and Michael Coughlan[2]

Résumé (traduit par la direction):La grande escroquerie en rapport avec le réchauffement planétaire («The Great Global Warming Swindle - GGWS») est un documentaire controversé en rapport avec le changement climatique réalisé par Martin Durkin de la télévision britannique. Ce documentaire milite contre la compréhension scientifique traditionnelle de l'intensité et de la cause du changement climatique récent et observé. L'opinion généralisée parmi les scientifiques du climat maintient que le réchauffement planétaire du 20e siècle est dû grandement à l'augmentation dans l'atmosphère des gaz à effet de serre produite par l'industrialisation croissante au cours des dernières 100 à 150 années. Durkin soumet une toute autre opinion, à savoir que le récent réchauffement planétaire n'est pas important et n'est pas dû à l'activité humaine. Selon l'opinion des scientifiques, le documentaire n'essaie pas de faire valoir aucune critique élaborée afin de contrecarrer le conformisme de la science du climat. Au contraire, il se contente de dire que les scientifiques du climat, de nos jours, sont au mieux sérieusement peu judicieux dans leurs avancés collectifs sur la nature et les causes du réchauffement planétaire, ou sont au pire coupables de tromper le reste de la communauté. La publicité faite autour du documentaire s'appuie fortement sur ce qui vient d'être mentionné, c'est-à-dire que le réchauffement planétaire est «la plus grande fraude des temps modernes». Le documentaire utilise une série de techniques pour ébranler la conviction du téléspectateur dans la compréhension traditionnelle actuelle de la science du climat et pour présenter une opinion contraire souple. Cet article va démontrer que le documentaire n'est pas scientifiquement fiable et présente une interprétation imparfaite et très fallacieuse de cette science. Pendant qu'on donne l'impression que la science fait l'objet d'une révision par des pairs, on constate que beaucoup de matériel présenté n'est plus à jour, déjà mis en doute ou d'origine incertaine. Un nombre de graphiques et de figures utilisés dans le documentaire ne sont pas basés sur des données climatiques connues ou publiées, pendant que d'autres sont présentées schématiquement, et en conséquence cet état peut désorienter et tromper le téléspectateur.

Background

The Great Global Warming Swindle (GGWS) is a controversial documentary on climate change by British television producer Martin Durkin. This documentary argues against conventional scientific understanding of the degree and cause of recent, observed climate change. The overwhelming view amongst climate scientists is that twentieth century global warming is largely due to an increase in atmospheric greenhouse gases resulting from increased industrialization during the last 100-150 years. Durkin presents an alternative view that recent global warming is neither significant nor due to human activity. The documentary does not attempt to argue the latter view through any critical deconstruction of climate science orthodoxies. Rather, it contends that modern climate scientists are at best seriously misguided in their collective opinion on the nature and causes of global warming, or are at worst guilty of lying to the rest of the community. Publicity for the documentary leans heavily towards the latter, stating that global warming is "the biggest scam of modern times".

There are at least three versions of this documentary currently in circulation. The first was shown on Channel 4 in the UK on 8 March 2007. A revised version was then shown on Channel "More 4" in the UK on 12 March, which corrected a number of obvious errors. A shortened (approximately 60-minute) version was due to air on Australian ABC Channel 2 on 12 July 2007.

The documentary uses a series of techniques, as listed below, to shake the viewer's belief in current orthodox understanding and to present an amenable contrary viewpoint.

- Several experts, labelled as 'authoritative', are interviewed to lend credibility to the documentary.
- These commentators are presented as 'insiders' who cast doubt on the integrity of climate change science and the IPCC assessment process that has led to current orthodox understanding.
- Alternate scientific contentions are presented in a credible way by selectively presenting facts and heightening uncertainties without context or by specious reference to the actual published science.
- The motivation and morality of scientists driving current orthodox understanding is questioned through aspersions that are conspiratorial in nature.

Most of the expert commentators appearing in the documentary are well known 'climate sceptics'. One of the key scientists interviewed for the original documentary, Professor Carl Wunsch, Chair of Physical Oceanography at the Massachusetts Institute of Technology, has publicly stated [1] that he was completely misrepresented in the documentary. Indeed, much of the documentary's shortening to 60 minutes for the ABC (about 15 minutes shorter than the original) is a result of heavy editing of

[1] First published in the Bulletin of the Australian Meteorological and Oceanographic Society, 20(3) 63-72. Reproduced here with the authorization of the authors and the publisher.

[2] National Climate Centre, Bureau of Meteorology, Australia

Professor Wunsch's contribution to the original version. His removal leaves the documentary with four climate experts: Richard Lindzen, Patrick Michaels, Roy Spencer and John Christy. To the best of our knowledge, none of these interviewees has published a credible alternative to the scientific consensus on global warming provided in the IPCC reports. They present intentionally or otherwise through selective editing, grossly simplified and often disingenuous and counter-factual arguments and quotes.

In summary the documentary is not scientifically sound and presents a flawed and very misleading interpretation of the science. While giving the impression of being based on peer-reviewed science, much of the material presented is either out-of-date, already discredited or of uncertain origin. A number of the graphs and figures used in the documentary are not based on any known or published climate data, while others are presented schematically, and hence may confuse and mislead the viewer.

Detailed Overview of Errors

Since its first screening in the UK, errors in the claims made in the programme have been well documented. This critique draws upon two sources[2,3] that have provided detailed discussions of factual errors in the GGWS. It also draws upon the IPCC reports and relevant literature to clearly outline the current state of knowledge in relation to issues that the programme presents as scientifically contentious.

ASSERTION: Global average temperature today is not as high as it was during other times in recent history, such as the Medieval Warm Period, indicating that the recent warming trend is a natural phenomenon.

The documentary attempts to support the claim that temperatures were higher in the recent past with the graph shown below 'Temp – 1000 Years' – attributed to the "IPCC". This graph purports to show global average temperature between AD 900 and "now", with the highest values recorded between about 1100 and 1300 (labelled as "Medieval Warm Period").

Figure 1: GGWS historical temperature graph *adapted* from the IPCC (1990) First Assessment Report.

The graph is actually a reproduction of a schematic diagram published by the Intergovernmental Panel on Climate Change (IPCC) in its First Assessment Report in 1990 (Figure 2). It is important to note that this schematic is largely based upon early reconstructions of European temperature changes such as that of Lamb (1988). Critically, the 1990 IPCC Report cautioned that "it is still not clear whether all the fluctuations indicated were truly global", underlying the fact that neither regional temperature averages nor temperature records from single locations can be used as proxies for global temperature.

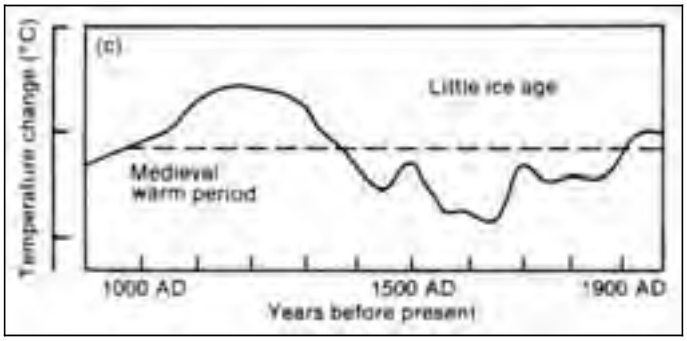

Figure 2: The temperature reconstruction shown in IPCC (1990) (largely based on European temperature series).

This seventeen year-old graph has been superseded by numerous more recent studies, with the IPCC successively publishing updated records of "near global "temperature in its Second Assessment Report in 1995, its Third Assessment Report in 2001, and its Fourth Assessment Report in 2007. The most up-to-date figure for the Northern Hemisphere, from IPCC (2007), is reproduced in Figure 3 which shows 12 different reconstructions. These consistently show that, for the Northern Hemisphere, the past century is exceptionally warm, and that the warmth of recent decades clearly exceeds that of the Medieval Warm Period in all cases.

The United States National Academies published a report in 2006 (NAS 2006) that reviewed the published scientific evidence on surface temperature reconstructions for the last 2000 years. It found that "[e]vidence for regional warmth during medieval times [centred around AD 1000] can be found in a diverse but more limited set of records including ice cores, tree rings, marine sediments, and historical sources from Europe and Asia, but the exact timing and duration of warm periods may have varied from region to region, and the magnitude and geographic extent of the warmth are uncertain". Based on a review of the scientific literature, the report concluded that "none of the large-scale surface temperature reconstructions shows medieval temperatures as warm as the last few decades of the 20th century".

Very clearly, the documentary has misrepresented the early IPCC figure, and ignored all IPCC updates to this figure. The analyses published by the IPCC strongly contradict the documentary.

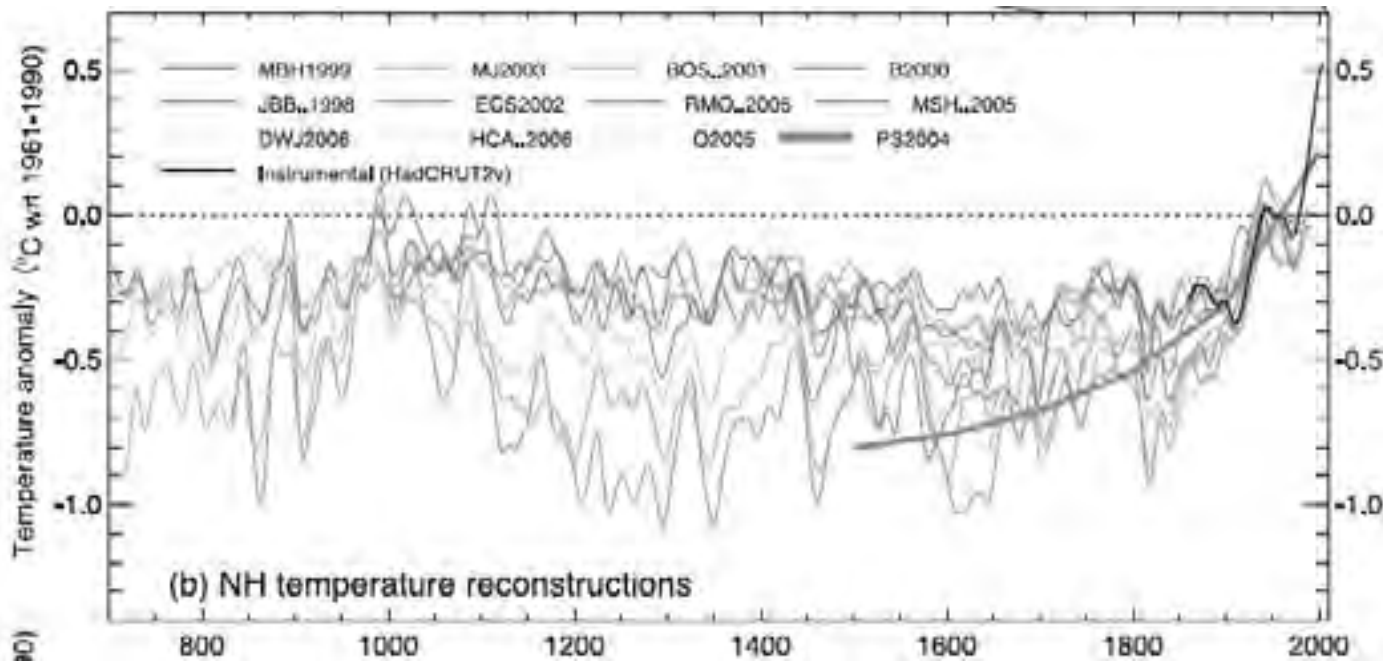

Figure 3: Northern Hemisphere temperature reconstruction (from IPCC 2007).

ASSERTION: Global average temperature decreased between 1940 and 1980, and so could not depend on atmospheric concentrations of greenhouse gases, which increased over this period.

The programme broadcast on 8 March on UK Channel 4 presented a graph, attributed to NASA, purporting to show "World Temperature – 120 Years" between about 1878 and 2002, plotted against temperature change ranging in value from about −0.05 to 0.70 (presumably °C). The graph, a heavily smoothed representation of temperature change, shows an almost continuous decrease in temperature between about 1940 and 1980 (Figure 4).

In the subsequent broadcast on More 4 on 12 March, the programme presented a slightly different version of the graph, with the title "World temperature – 110 Years". The attribution to NASA was now omitted (but not replaced with any other attribution), and the scale of the x-axis was altered such that the graph covered the years from 1880 to about 1990. Despite this change in the x-axis scale, the shape of the plot remained the same as originally broadcast, such that the apparent decline in "World Temperature" was this time shown to occur between about 1940 and 1967.

The origin of Figure 4 is obscure. The original graph corresponds very closely to Figure 12 of a paper by Arthur Robinson and Zachary Robinson of the Oregon Institute of Science and Medicine, with co-authors Sallie Baliunas and Willie Soon of the George C. Marshall Institute. This paper appeared in the September/October 1998 issue of 'Medical Sentinel'.

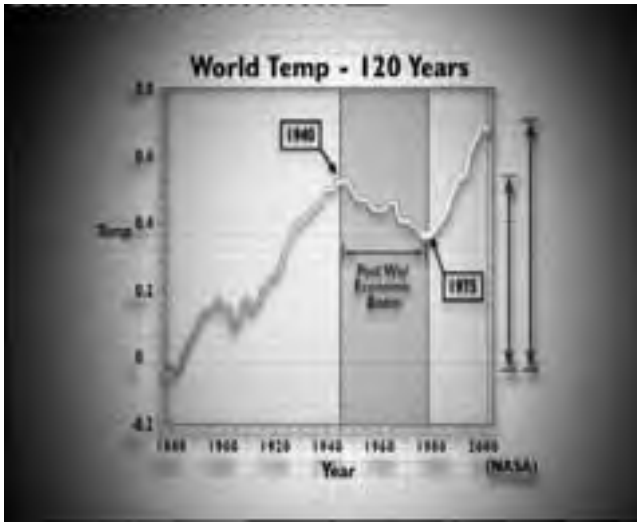

Figure 4: The temperature series shown in the original GGWS. The producers in the follow-up broadcast showed a different graph that implicitly 'admitted' the data actually ended in 1988, rather than around 2005-06 as suggested here.

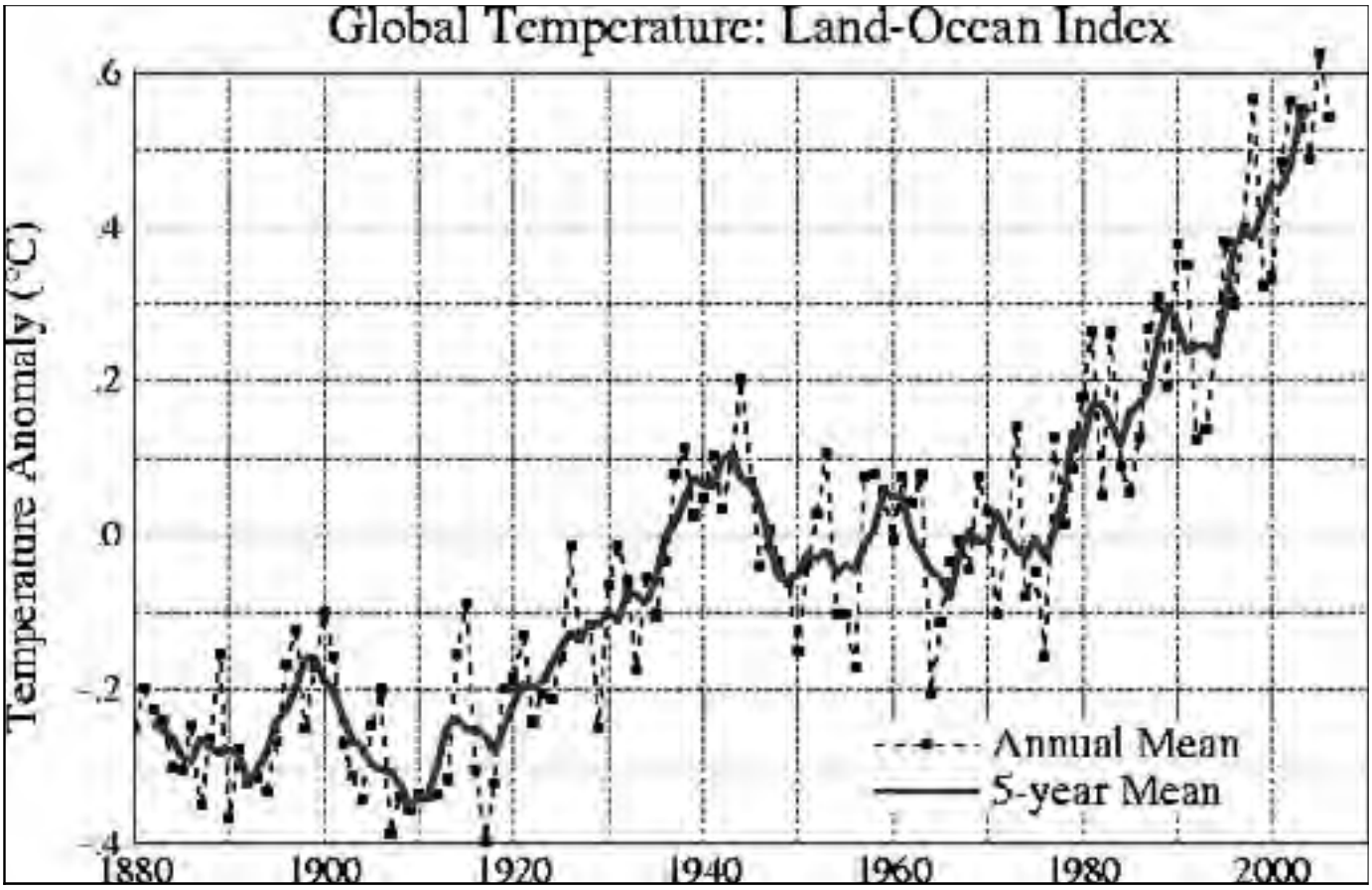

Figure 5: Global average temperatures based on NASA GISSanalyses (available from http://data.giss.nasa.gov/gistemp/graphy

Measurements from meteorological stations that have been published by NASA and other agencies show that there was an overall slight decline in global temperature between about 1940 and 1976, but this decline was far less than that shown on the graph presented in the documentary (the decline seems to be around half that shown, but the actual value is uncertain as the programme shows a highly smoothed graph). A copy of the most recent global temperature series from NASA's GISS is shown in Figure 5. The data used in this figure are widely available and are peer reviewed. Further, updates of these data to May 2007 show that global temperatures for 2007 are currently running at warmest on record.

The documentary's use of out-dated datasets also allows it to make the clearly incorrect statement that most global warming occurred prior to 1950. This central claim is clearly false, particularly when data from the last 10 years are included in the assessment.

In the Australian release of the film (made available to the authors by the ABC), the "NASA" curve is replaced by one from the IPCC (2001) report. This curve is not the most recent available and does not include the years 2001 to 2006 which include the globe's second, third, fourth, fifth, sixth and seventh warmest years on record (1998 and 2005 are generally accepted as being equal warmest). With the film's original point no longer valid, a five-year-old figure for Arctic temperature is shown in tandem with global carbon dioxide. It is quite meaningless to compare a regional temperature series to global levels of carbon dioxide.

Further, it is disingenuous to expect that a monotonic increase in carbon dioxide will lead to monotonic increases in temperatures. The anthropogenic greenhouse effect overlays other natural climate changes such as those associated with volcanic activity and the El Niño-Southern Oscillation, as well as other human-induced climate changes (such as the "dimming" or cooling effect of aerosols released by industry during and after WWII, and subsequently reduced in the 1970s amidst concerns about acid rain). Numerous scientific papers have shown that the global temperature trend of the last century is entirely consistent with climate model simulations, which consider all such climate change mechanisms. This point is well made in the Third (2001) and Fourth (2007) IPCC Assessment Reports.

The fact that this stalling of the global temperature rise is well understood and reproducible in climate models further

strengthens the confidence in the science of global warming.

ASSERTION: Climate models suggest that greenhouse gases should warm the troposphere faster than the surface, but observed data show that the surface is warming more quickly, indicating that any climate change that is occurring is not due to human activities.

For the most part, public dissemination of the science of climate change relies on the concept of global mean surface temperature. This concept is useful for the good and simple reason that it is a relatively easy way to describe global climate change. However, climate science uses many different climate parameters and lines of evidence to attribute recent global warming to the enhanced greenhouse effect. These lines of evidence include spatial patterns of temperature change, also known as climate 'fingerprints'. Use of the climatic fingerprinting technique has consistently shown that recent warming is largely due to greenhouse gas increases.

The pattern of temperature change through the vertical column of the atmosphere is one such spatial 'fingerprint' used by climate scientists to assess what has caused recent warming. Over the years, inconsistencies between climate models and observations meant that climate scientists had a difficult time explaining exactly what they were seeing. These issues have been addressed over the last five years, principally through increased understanding of satellite and balloon-borne radiosonde data. From these investigations there is now even firmer evidence for the enhanced greenhouse effect. The vertical structure of warming in the atmosphere, with large warming at the surface and cooling in the stratosphere, implicates greenhouse gases as the main cause.

The GGWS introduces only a very small piece of this puzzle to the viewer, viz. the apparent inconsistency between the way climate models and observations have characterized the vertical structure of the atmosphere. As mentioned above, this problem has been dealt with in a number of peer reviewed publications and is now satisfactorily understood. The science is clear, that there is no significant difference between modelled and observed vertical temperature profiles. From the outset, this issue was never large enough to outweigh all other evidence for the enhanced greenhouse effect, yet the assertion of some ongoing controversy in this area continues to be put forward by climate change sceptics. The documentary provides a simplistic and misleading interpretation of a very complicated concept that few viewers would be capable of properly comprehending.

ASSERTION: Volcanoes produce far more carbon dioxide than human activities, so anthropogenic greenhouse gases cannot be having a significant effect on global average temperature.

The documentary's claim that volcanoes produce more carbon dioxide than human activities is incorrect. It is difficult to know on what basis this claim is made, as the producers did not cite a source. However, a paper by Nils-Axel Morner and Giuseppe Etiope, published in the journal 'Global and Planetary Change' in 2002, estimated that the lower limit for global volcanic degassing of carbon dioxide at around 300 million tonnes per year. By comparison, Gregg Marland and his colleagues at the U.S Dept. of Energy's Carbon Dioxide Information Analysis Center have estimated that 26,778 million tonnes of carbon dioxide were emitted by human use of fossil fuels in 2003. Therefore, although Morner and Etiope did describe their estimate of carbon dioxide emissions from volcanoes as "conservative", it is less than two per cent of the annual emissions of carbon dioxide from human use of fossil fuels.

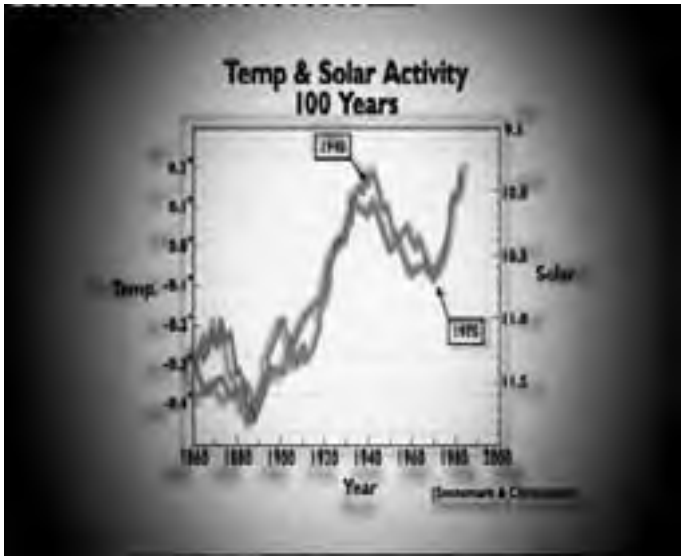

Figure 6: The temperature series shown in the original GGWS with an overlaid series of the "solar activity" (length of the solar cycle).

ASSERTION: Ice cores show that, during earlier periods in the Earth's history, rises in carbon dioxide followed increases in temperature, and therefore by implication the current rise in greenhouse gas concentrations has not caused the recent increase in global average temperature.

Research using ice cores from Antarctica show that local temperature rises during the very long periods of transition from glacial (cold) to interglacial (warm) periods are the result of the slow, regular and largely predictable changes in the Earth's orbit. The same research also indicates that these temperature changes occurred prior to associated increases in the local average concentration of atmospheric carbon dioxide. In other words, in the past, warming episodes initially led increases in greenhouse gases. The conclusion drawn in the documentary is that, since carbon dioxide increases in the past (approximately 1 million years ago) occurred after global temperature increases commenced, current global warming cannot be caused by greenhouse gases. This is a simplistic and piece-meal presentation of a complex issue.

Again, this issue is not an ongoing controversy in climate science. Research suggests that the fluctuations in global temperature associated with the glacial cycle (ice ages) are associated with the Earth's orbital changes. These changes occur on timescales ranging from around five thousand years to tens to hundreds of thousands of years. Inter-glacial warming or deglaciation (the period of warming coming out of an ice-age) is also triggered by changes in the Earth's orbit. The steady rise in temperature (but very slow compared to 20th Century warming) is then the product of a complex feedback between the warming and changes in atmospheric greenhouse gas concentrations. Simply put, the gradual warming of the oceans leads to a release of more greenhouse gases, which in turn causes more warming. As such, there is a positive feedback between warming and greenhouse gases (carbon dioxide in particular). The ice-core temperature record does not indicate that carbon dioxide does not cause warming. It indicates that warming in interglacial periods is not instigated by carbon dioxide, but is carried on or enhanced through its agency. This evidence, rather than refuting evidence for the enhanced greenhouse effect, suggests that injection of carbon dioxide into the atmosphere by artificial means is likely to cause warming in the atmosphere. The paleoclimate science is very clear on the substantial role that historical carbon dioxide concentrations have played in climate variability, and this role is not a significant matter of debate or uncertainty.

The GGWS producers misrepresent the contents of a paper by Nicolas Caillon and co-authors (published in the journal 'Science' in 2003) in relation to this issue. The work of these authors, in showing the sequence of warming and carbon dioxide increase in the past, never concluded that carbon dioxide could not lead temperature increases.

The programme fails to point out that the Caillon et. al. record of temperature increases, followed by rises in carbon dioxide concentration, all relate to episodes of deglaciation. The last deglaciation on Earth occurred 12,000 years ago. The current rise in carbon dioxide and other greenhouse gases, such as methane and nitrous oxide, started during the Industrial Revolution in the 18th century, more than 11,000 years after the last deglaciation.

As the IPCC Third Assessment Report in 2001 points out, the atmospheric concentration of carbon dioxide prior to the Industrial Revolution was 280±10 parts per million. Levels have risen continuously ever since, reaching 377 parts per million in 2006. The atmospheric concentration of carbon dioxide today is 25 per cent higher than the maximum level recorded at any time during (at least) the 650,000 years prior to the Industrial Revolution.

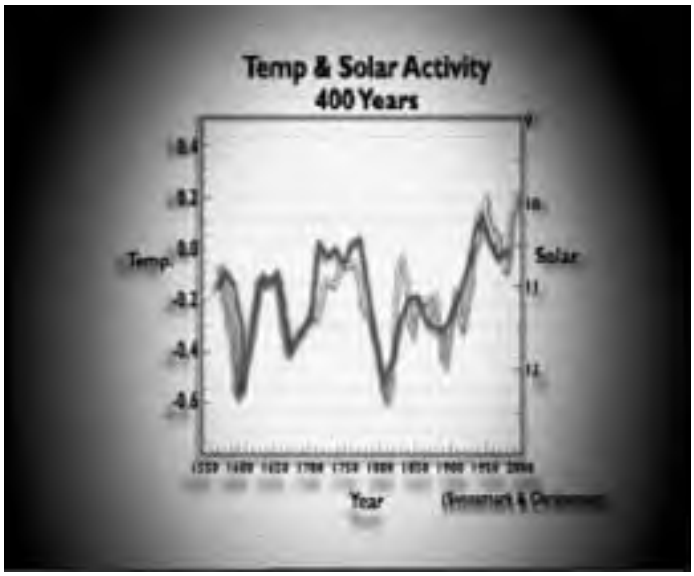

Figure 7a: Extended temperature series shown in the original GGWS with an overlaid series of the "solar activity" (lenght of the solar cycle). The original figure on which this is based is shown on the right (Figure 7b).

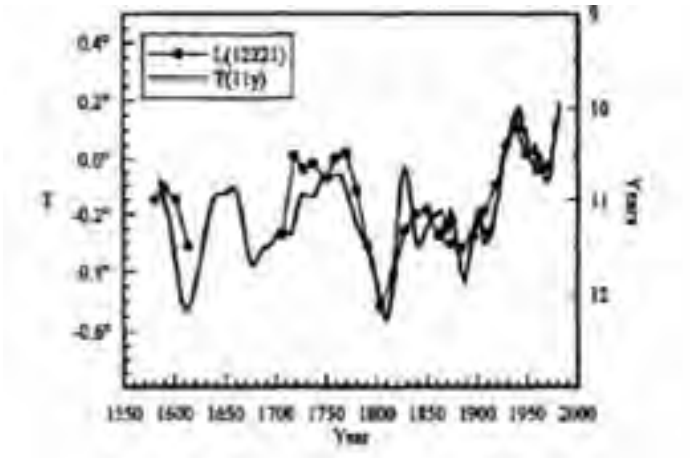

Figure 7b: Eleven-year average of annual mean values of the northern hemisphere land air temperatures 1579-1860 relative to the average temperature 1881-1975, reconstructed by Groveman and Landsberg (1979) together with corresponding values for 1851-1987 relative to 1951-1980 from Jones *et al.* (1986) and Jones (1988). Also plotted is the filtered value (1-2-2-2-1 filter) of the sunspot cycle length.

ASSERTION: The variation in global average temperature over the last couple of centuries can be explained by the effect of solar activity instead of the rise in greenhouse gas concentrations since the Industrial Revolution.

There is no evidence that warming over the 20th century can be substantially explained by solar radiation changes, particularly warming in the latter half of the twentieth century, which has been strongly attributed to increases in greenhouse gases. Indeed, since around 1950 the combination of solar and volcanic activity changes has likely acted to cool the globe. Several studies claiming a strong link between solar changes and global warming have been published in the grey literature or in non-climate-related journals. These studies have generally been examined and subsequently refuted by peer-reviewed research. In most cases, the basic methodologies of these studies were shown to be in error or to have lacked rigour. We outline some examples below.

The documentary presents a graph, attributed to Svensmark and Christensen, purporting to show variations in temperature and solar activity (in unspecified units) for "100 Years". The record of temperature on the graph extends from 1860 to about 1982, while the record of solar activity only extends to about 1975. The solar activity curve shown is not a conventional one, but rather based on the so-called "solar cycle length".

Damon and Laut (2004) and others have shown that when analysed correctly, there is little if any relationship between the solar cycle length and global temperatures from 1700 to around 1950, and since 1950 the changes show no relationship at all. These analyses are well known and accepted.

The best record of solar changes exists from the 1970s to present. Climate researchers have reconstructed a number of likely past solar radiation changes to assess the influence that such changes may have had on global climate. These studies all show that the magnitude of solar radiation changes over the 20th century has been far too small to be the cause of the observed global warming. This consistent finding has been omitted by the producers of GGWS, and the absence of sensible units in their graphic (Figure 6) obscures this fact from the viewer. In addition, the figure does not show temperature or solar radiation changes over the last twenty-five years. This is the period of highest quality data and a period where basic data show little or no relationship between solar radiation and global temperature.

An extended time series included by the producers deserves special consideration (Figure 7: left panel). This diagram as shown is based on a paper by Lassen and Friis-Christensen (1995) with the original figure shown on the right. The curve in the documentary contains solar data from 1610-1710, a period in the 1995 paper without data. It is unclear from where this added data has been derived, though the striking match with temperatures seems physically implausible.

In addition, the underlying temperature series are not the same as others shown in the programme. They are a very early (more than 30 years old) temperature series for the Northern Hemisphere. The striking correspondence between the temperature data and solar data in this curve is very surprising, as modern-day temperature reconstructions based on much more data and improved techniques are very different from those shown in the graph.

There are numerous other errors in the programme's solar radiation thesis. For instance, the programme fails to point out that the length of a sunspot cycle is not a good indication of the sun's energy output. A recent review of the scientific literature by Peter Foukal and co-authors, published in the journal Nature in 2006, drew attention to the fact that the proper measure of the sun's total contribution to the temperature on Earth is "the wavelength-integrated radiation flux illuminating the Earth at its average distance from the sun, called the total solar irradiance (TSI)". The authors of this paper stress that observations of sunspot cycle length "lack a demonstrated connection to TSI variation". Precise measurements of TSI have been possible through satellite-borne radiometry since the 1970s and, as the paper by Foukal and his co-authors makes clear, "the variations [in TSI] measured from spacecraft since 1978 are too small to have contributed appreciably to accelerated global warming over the past 30 years".

Finally, the programme fails to point out that in order to reproduce the various decadal and century scale changes in global mean temperature since the Industrial Revolution, models need to take into account all major natural and man-made factors that influence climate. This point is clearly outlined in the latest IPCC scientific assessment report. Meehl et al. (2004) for instance, confirmed previous studies which showed that changes in solar and volcanic forcing contributed to increases in global average temperature during the first forty years of the twentieth century, and that the increase in temperature since the late 1960s was mostly caused by the increase of greenhouse gases, partially offset by aerosol cooling.

Summary

The Great Global Warming Swindle does not represent the current state of knowledge in climate science. Scepticism in science is a healthy thing, and the presence of orthodox scientific scepticism in climate change is ubiquitous. Many of the hypotheses presented in the Great Global Warming Swindle have been considered and rejected by due scientific process. This documentary is far from an objective, critical examination of climate science. Instead the Great Global Warming Swindle goes to great lengths to present outdated, incorrect or ambiguous data in such a way as to grossly distort the true understanding of climate change science, and to support a set of extremely controversial views.

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[2]
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[3]
Real Climate http://www.realclimate.org/

Using PCGRIDDS32 to play with CMC model data

by Lewis Poulin[1]

MSC has a growing volume of meteorological model data in GRIB1 format that is freely available from:

http://www.weatheroffice.gc.ca/grib/index_[e,f].html.

Luckily, it's now easier than ever to use your pc to view and manipulate model data thanks to the PCGRIDDS32 and WINGRIDDS packages now available on the Internet.

In the 1990s, many meteorologists were familiar with the 16-bit DOS-based version of PCGRIDDS (PCGRIDDS stands for Personal Computer based GRidded Interactive Display and Diagnostic System). PCGRIDDS was used to help retrieve, display and manipulate meteorological (mainly U.S.) model data in GRIB1 format. The original PCGRIDDS, written by Dr. Ralph Petersen and Jackie Lord of the U.S. National Weather Service, was used extensively by meteorologists, in North America and abroad, to access a wide variety of model data using their local PC.

In the late 1990s, as model resolution and file sizes increased, the original 16-bit PCGRIDDS could not keep up with the increased volumes of data. Was PCGRIDDS on the fast track to obsolescence?

Before Dr. Petersen retired he graciously passed the PCGRIDDS code to developer Jeff Krob of NOAA. This allowed Jeff to modernize the code and create PCGRIDDS32 and WINGRIDDS.

The following four paragraphs, taken from the PCGRIDDS32 homepage and user manual, describe some of the features.

"PCGRIDDS32 is the modern version of PCGRIDDS which now offers 32-bit programming power to what was an already very capable and powerful system. PCGRIDDS32 retains the original PCGRIDDS look-and-feel while adding the ability to process much larger GRIB1 (and now GRIB2) data sets, more flexible display capability and increased processing speed. There have been very few restrictions and numerous improvements over the 16-bit DOS version of PCGRIDDS and many others are in the plans. The differences between PCGRIDDS and PCGRIDDS32 are comprehensively described in the documentation. It's important to note though that PCGRIDDS32 is not a full Windows, 'point-and-click' GUI program. Users wanting a windows environment should use WINDGRIDDS instead."

"WINGRIDDS, also 32-bit, is the full MS Windows compliant 'point-and-click' GUI version of PCGRIDDS32. WINGRIDDS stands for WINdows based GRidded Interactive Display and Diagnostic System."

"WINGRIDDS and PCGRIDDS32 both allow users to view meteorologically significant fields of gridded analysis and numerical weather prediction model output available in GRIB1 (and also GRIB2) format. The fields are displayed in either contour or vector format, whichever is appropriate for a particular field. This package also allows the user to extract a variety of information from meteorological diagnostic parameters computed directly from the gridded data fields."

"The flexibility of WINGRIDDS allows the package to meet the needs of users with a very wide range of skills and requirements. The novice can quickly learn to display a wide variety of predefined products using the WINGRIDDS Menu system. More advanced users can develop specialized products to meet their individual needs using the programmable WINGRIDDS Command language, including the creation of customized menu options to meet specific user needs."

Having been an avid user of the original PCGRIDDS I was very keen to give PCGRIDDS32 a test drive.

The PCGRIDDS32 and WINGRIDDS code is available at:

http://winweather.org/.

Installing PCGRIDDS32 and WINGRIDDS was easy on my home pc (running Windows XP) and in my VMware windows environment running on my Linux workstation. There are suggestions in the documentation that a Linux version of these packages may one day be available.

If you want to install both packages, you have to do two installations. Both packages use the same core programs. The PCGRIDDS32 package is used by keyboard commands while WINGRIDDS can be operated as a windows program with point and click.

As I am more familiar here with PCGRIDDS32, I will limit my comments to this package, although the adjustments described below apply also to WINGRIDDS. If you are using WINGRIDDS, simply replace paths that include c:\PCGRIDDS32 with c:\WINGRIDDS.

[1]Canadian Meteorological Centre
Dorval, Québec, Canada

The package comes with a user manual in .pdf format that is very well written. I use it regularly to look up information. You can also access help information from the program's command line when using the software. Reading the manual, along with the help information screens, are easy ways to get an overview of PCGRIDDS32 and WINGRIDDS.

Because the software was written mainly for U.S. datasets, you have to add little information to three configuration files before properly ingesting and viewing CMC GRIB1 data. Those files are: griblevl.dat, gribmodl.dat and gribparm.dat all located in the c:\PCGRIDDS32\GRIB\ directory.

A description of which files to adjust and how to adjust them is posted on the PCGRIDDS32 homepage referred to above, in its section describing the CMC GRIB1 datasets. To make it even easier, I have placed copies of the files with adjustments already included at the following link:

http://collaboration.cmc.ec.gc.ca/cmc/cmoi/SolarScribe/PCGRIDDS32/GRIB/

If you use my files, you'll have to paste them into your own c:\PCGRIDDS32\GRIB\ directory. (Note: Make a backup copy of your original files before overwriting them with my versions).

Once you've adjusted the three files referred to above, you are now ready to get some CMC GRIB1 data. All CMC GRIB1 regional, global and ensemble datasets are free.

To get a few low resolution (lores) files, go to one of these web pages to get a few files.

Low resolution Regional GRIB1 files:

http://dd.weatheroffice.ec.gc.ca/grib/public/lores/CMC_reg_00

Low resolution Global GRIB1 files:

http://dd.weatheroffice.ec.gc.ca/grib/public/lores/CMC_glb_00

Access to high resolution CMC GRIB1 files is also free but first requires the user to obtain a free username and password.

If you don't have a user name and password yet and you would like to test drive high resolution grib files in PCGRIDDS32, you can retrieve a few samples files from:

http://collaboration.cmc.ec.gc.ca/cmc/cmoi/SolarScribe/PCGRIDDS32/GRIB/NW/

I suggest for this exercise you collect files at forecast hours 000 and 006 that contain the following information in the filenames: PRMSL_MSL, TMP_TGL_2, TCDC_SFC, UGRD_TGL_10, VGRD_TGL_10

No matter which sample files you retrieve, simply save them to your local c:\PCGRIDDS32\GRIB\NW\ directory.

Now that you have raw data in the right place on your pc, you have to translate the GRIB1 format into a PCGRIDDS32 friendly format.

Again, I will describe here how translate GRIB1 to PCGRIDDS32 format. The procedure for WINGRIDDS is very similar and a lot more intuitive because of its point and click features.

Double click on the file c:\PCGRIDDS32\P32.bat then select (1) to Ingest GRIB data. On the next table select (7) to Convert NWS GRIB Data to PCGRIDDS32 format. This will launch the program NGRB2PCG32.exe that creates pcgridds32 formatted files of your GRIB1 data and places these translated files in: c:\PCGRIDDS32\GRIDDATA\

When this translation of GRIB1 files is completed, enter X in order to return to the main menu then exit the application. Check that c:\PCGRIDDS32\GRIDDATA\ contains files of the type MMMDDYYHH.xxx255 where MMM = month, DD=day of the month, YY = last 2 characters of the year, HH = Run, either 00 or 12, xxx = GEM or GLB (ex: AUG010512.GEM255 is for CMC regional model data and AUG010512.GLB255 is for CMC global model data).

To display your model data in PCGRIDDS32, double click on c:\PCGRIDDS32\PCG32.bat (NOTE: Occasionally I have noticed the startup screen go blank. Simply do Alt-Enter to get the window's frame, then kill the window with the x in the top right corner then try again. We may have to alert Jeff Krob about this.)

When you startup PCGRIDDS32, you must first Select a new forecast file. Files listed in the pop-up menu are copies of those files that were created in c:\PCGRIDDS32\GRIDDATA\. Put the cursor on the file you would like then hit enter. As the data are loading you will get a short glimpse of the geographical grid used by this data followed by a list of the contents of the GRIB file that has just loaded. Press F12 twice to step backward through the menus to the main control line then use the arrow key to move the cursor over to the word Command towards right hand side of the top line, then hit enter.

This puts you in command mode. You should now see a listing of the contents of the GRIB1 file for a particular time step. The contents are described in pairs of words up to 4 characters long. The first set of up to 4 characters describes the variable and the second set of up to 4 characters describes the level. Ex: TCLD SFC means total cloud from the surface, TEMP 2m means temperature at 2m.

In general, to display a field, you have to select a forecast hour, a variable name and its level. For example (Assuming you retrieved the files mentioned above), type the commands listed in the following table:

f00 then hit enter (this selects forecast hour 00)
list then hit enter (this displays the variables and level available)
temp 2m then hit enter (this displays temperature at 2m)
tcld sfc then hit enter (this displays total cloud)
bkph 10m then hit enter (this displays wind barbs in km/hour)
pres msl then hit enter (this displays mean sea level pressure)
pres msl data then hit enter (displays the grid point values of msl pressure
dump alat data then hit enter (writes grid point values of latitude, in ascii format, to the file C:\PCGRIDDS32\GRIDS.OUT
dump alon data then hit enter (writes grid point values of longitude, in ascii format, to the file C:\PCGRIDDS32\GRIDS.OUT
dump pres msl data then hit enter (writes grid point values of msl pressure, in ascii format, to the file C:\PCGRIDDS32\GRIDS.OUT)

To change forecast hour simply enter f06 then hit enter (to go to forecast hour 6) then you can repeat commands mentioned above.

Remember to get back to the list of variables available, you can type the word list then hit enter at any time.

Try typing the word help on the top line, followed by enter, to access PCGRIDDS32's internal help file. Use the numbers to navigate through the help file displayed on the screen.

To exit PCGRIDDS32 you can type exit on the Command line then hit enter.

To go back to the main menu line (the level above the Command level) type menu followed by enter. You can then use the arrow keys to move the cursor to other sections like Products, Specs and Display. Display is useful. The Plan section under Display allows you to define the geographical domain displayed on the screen. To change the domain, look up information on Display in the manual or help file.

There's a lot more!

You can use PCGRIDDS32 to calculate pretty much any derived parameters, for example severe weather indices such as CAPE. In fact the packages come with nearly 1700 packaged commands called macros, found in the c:\PCGRIDDS32\MACROS directory. You can execute a macro's commands by typing the macro's 4 character name on the command line followed by a . (period). Caution: You must have the appropriately named variables available in the GRIDDATA directory for a macro to work properly.

Exit PCGRIDDS32 and we'll write up a simple macro to show how easy it is.

Create a macro file called mine.dat. You can start from scratch though often I just copy an existing macro file and rename it to what I want. Put the information shown in the following table in your file mine.dat respecting the layout below:

```
f00
temp 2m
tcdc sfc
pres msl
loop
f00
temp 2m
tcdc sfc
pres msl
endl
loop
f00
dump alat data
dump alon data
dump temp 2m data
dump tcdc sfc data
dump pres msl data
endl
```

Now put this file in your C:\PCGRIDDS32\MACROS\ directory alongside the other macros.

Start up PCGRIDDS32, load a data file and navigate to the command line as we did above. Once you are at the command line, type mine followed by a period . then hit enter.

Not much is happening yet since you have to hit enter on the keyboard to advance through each of the lines in your mine.dat macro to execute those commands. Hit enter and watch which variable is drawn on the screen.

When you get to the first loop command, you will see a quick succession of contoured fields: temperature 2m, total cloud and msl pressure since now your macro is running the commands between the first loop and endl commands.

If you hit enter again, you will now execute the second loop in your macro mine.dat. This time you should see a quick succession of screens displaying gridpoint values on the screen. This is because the word data is included at the end of each of these commands in the mine.dat macro.

Now exit pcgridds32 and open the files c:\pcgridds32\grids.out (a simple text file). You'll notice this file contains the gridpoint values that were displayed on the screen for latitude (alat), longitude (alon), temp 2m, tcdc sfc and pres msl. This ascii dataset was produced by the second loop in your mine.dat macro using the dump command.

I have used the dump and data commands in the original pcgridds, to dump about 40 parameters to the grids.out file, in ascii format at 6 hour intervals so that a separate computer

program could then read the values and calculate weather forecasts automatically for me. The dump, data, alat and alon commands are useful features for connecting latitude and longitude with the gridpoint values.

PCGRIDDS32 now also allows users to start up the software so that a file is loaded and a macro activated automatically at startup. This is a powerful feature that now allows users to schedule the retrieval of grib files, followed by running the pcgridds32 macro to, for example, create images, or dump data automatically.

Read the documentation to learn more about macros and don't forget to read the macros in the MACROS directory to learn more about how the commands should be used. The growing PCGRIDDS32 user community will also be able to help you develop new macros.

And there's more. With PCGRIDDS32, you can view cross sections and time sections. PCGRIDDS32 also processes GRIB2 datasets. The use of configuration files in ASCII format make it easy for the user to tailor the system to the user's needs.

Schools and universities can use PCGRIDDS32 to automate the retrieval and display of model grids to introduce students to model data and use it for science related projects. The software is now advanced that it should be possible for high school, college and university students can really have fun with CMC GRIB1 model data.

In fact, I am helping a group at Concordia University students at the solar buildings research network to test the use of PCGRIDDS32 for the processing of solar flux data from the CMC grib files to be input into their solar energy research projects. I can provide a renewable energy macro to users interested in this topic.

If you would like to try using wget to allow you to use your pc to get a variety of CMC GRIB1 data automatically, make a new directory called: c:\PCGRIDDS32\wgetdata and save a copy of the following .bat file in that directory:

http://collaboration.cmc.ec.gc.ca/cmc/cmoi/SolarScribe/PCGRIDDS32/wgetdata/wgetCMCgrib_example.bat

The information in this file should help you get started for using wget.

I hope you give PCGRIDDS32 a test drive and enjoy it as much as I do. If you have experience with WINGRIDDS, or you'd like to learn more, why not send your comments to the editor so we determine if we should offer more articles such as this one.

Report from Project Atmosphere 2007

by Sonia Rebellato

Every summer, the American Meteorological Society (AMS) with the support of the National Oceanic and Atmospheric Administration (NOAA) offers a two-week workshop for elementary and secondary school teachers. The workshop entitled Project Atmosphere is designed to prepare peer trainers on atmospheric topics and is hosted at the National Weather Service Training Center in Kansas City, Missouri. The tradition over the years has been to offer one of the 20 coveted spots to a Canadian teacher as selected by the Canadian Meteorological and Oceanographic Society (CMOS) with the support of the Canadian Council for Geographic Education (CCGE). As a geography teacher and co-chair of the Geography Subject Council for the Dufferin-Peel Catholic District School Board, I was honoured to be selected this year.

The AMS staff, including Dr. Geer, presented lessons on various atmospheric topics before sharing educational modules and application ideas that could be used in the classroom. Most remarkable was the number of specialists who travelled to generously share their knowledge with a group of teachers. Field trips supplemented in-class experiences.

Automated Surface Observing System (ASOS)

Sonia Rebellato

Teachers were taught the different components of the Automated Surface Observing Systems (ASOS) which provide the US's primary surface weather observations. Components included the Acquisition Central Unit, the hygrothermometer (temperature/dew point sensor), Laser Beam Ceilometer, freezing rain sensor, and visibility sensor among others. As ASOS updates observations every minute, year round, improved forecasts and warnings are possible.

Daily weather briefings were held to guide teachers in the interpretation of infrared, visible, and water vapour satellite images. As useful as all the technology is, the human component cannot be dismissed. Forecasters know their physical area and can incorporate local effects that computer models miss. Teachers gained a greater appreciation of the knowledge and skill base required for meteorologists.

Mary Glackin, Acting Director of the National Weather Service (NWS), relayed that NOAA's vision begins with an informed society. Approximately 50,000 warnings are issued annually from the 122 weather forecast offices. As a typical year in the US brings 500 deaths, 5, 000 injuries, and $14 billion in losses that are weather-related, there is an increased awareness of the need to be prepared. To improve forecasting in Alaska, Ms. Glackin indicated the region would be bolstered due to increased economic interests and climate change. Tsunami warning centres in Alaska and Hawaii have also seen improvements since the 2004 Indian Ocean tsunami.

Dr. Louis Uccellini, Director NCEP/NWS/NOAA, shared that ¼ of the US economy is weather-sensitive before describing various forecast systems. The North American Ensemble Forecast System sees the sharing of 120 global ensemble forecasts, 40 of them from Canada. Short Range Ensemble Forecasts are used to address winter storms, dry lightning, and precipitation (significant for river flooding). He also indicated there is a demand for 7-day forecasts for extreme events.

Space weather monitoring is becoming increasingly important according to the Director. NOAA has designed Space Weather Scales to report geomagnetic storms, solar radiation storms, and radio blackouts. The increased reliance of the public on communication satellites, whether for GPS navigation data or cell phone conversations, means a greater number of people may be impacted by space weather events. From solar flares to riptides, the NCEP mission truly extends from the sun to the sea.

Dr. Richard Knaff of the Tropical Prediction Center indicated that the El Niño period translates to fewer hurricanes in the Atlantic. While there were only 5 major hurricanes in 1992, Hurricane Andrew still stands out for the costly damage it evoked just south of Miami. As a senior hurricane specialist, Dr. Knaff also described how Hurricane Katrina was a Category 1 over Florida before tapping into the Gulf waters and turning into a Category 5. Most fatalities attributed to Hurricane Katrina were due to storm surges. Dr. Knaff indicated the Center utilizes computer forecasts, dropwindsondes, and C130 planes. Partnerships with other countries are important. Based on the case of a 1938 storm, a hurricane on Puerto Rico could hit New York in 24 hours. Hurricanes that move north typically accelerate, a fact not lost on the Atlantic provinces.

Ron Przybylinski of the St. Louis NWS Office provided an overview of radar theory, supercell storms and bow echoes. He outlined a plan to put Doppler radar on cell towers. Additionally, two case studies, the Evansville, Indiana tornado (November 2005), and the tornado outbreak over Missouri (March 12, 2006) were highlighted. He described the enhanced Fujita Scale and displayed reference pictures used in determining the F-scale based on damage characteristics.

The Aviation Weather Center (AWC) in Kansas City, Missouri, provides aviation warnings and forecasts of hazardous flight conditions (turbulence, thunderstorm, icing, and volcanic ash). The forecasts for thunderstorms, the Collaborative Convective Forecast Product, (CCFP), are the result of the combined efforts of meteorologists from commercial airlines, the FAA's System Command Center, the AWC, and the Meteorogical Service of Canada. Meteorologists at the 8 forecast desks (3 for the contiguous US, 2 for thunderstorms, and 3 for international) demonstrated their duties at the desk. It was impressive to see the number of aircraft on computer screens that were benefiting from the work of 8 intrepid meteorologists.

Launch of a Weather Balloon

Up, Up and Away!

Arrangements were made for the group to visit the Topeka NWS office and witness a radiosonde launch. The balloon-borne instrument package relays back data regarding temperature, air pressure and relative humidity. (One instructor reminisced about searching for Canadian radiosondes because their unique humidity sensor used a human hair to measure fluctuations.) The Topeka ground station is one of hundreds around the globe that launch a radiosonde simultaneously twice a day at 0000 GMT and 1200 GMT in order to capture a synoptic view of the weather. Each launch is estimated to cost $100 (US). The package, attached to the balloon basically by kite string, reaches 100,000 feet within 100 minutes, where it frequently breaks off. The Topeka site reports 25% of their radiosondes are returned.

The Topeka Ground Station

Overall, Project Atmosphere offered a first-rate learning experience that included extensive technology, but more importantly highlighted the spirit of co-operation and commitment amongst those who work in the atmospheric sciences. I am thankful to the CMOS and the CCGE for this invaluable professional development opportunity and look forward to sharing it with my colleagues.

A-O Abstract Preview

Avant Première des résumés de A-O

The following abstract will soon be published in your ATMOSPHERE-OCEAN publication.

Le résumé suivant paraîtra sous peu dans votre revue ATMOSPHERE-OCEAN.

Climatic Influences on Markovian Transition Matrices for Vancouver Daily Rainfall Occurrence

SEAN W. FLEMING
e-mail: fleming_sean@hotmail.com

Abstract
Two-state, first-order, single-site Markov models for daily precipitation occurrence were developed for each winter rainy season over the historical period of record at five long-term meteorological stations in the lower Fraser Valley of British Columbia, Canada. Monotonic temporal trends in the independent elements of the transition matrices were then assessed. Although the results remain tentative, there is some evidence for a regionally coherent long-term negative trend in the probability of wet-to-dry state transitions, P_{10} (or a positive trend in the probability of a wet day being followed by another wet day, P_{11}). In contrast, there is no evidence for a regionally coordinated and consistent trend in the probability of dry-to-wet state transitions, P_{01} (or, therefore, in the probability of a dry day being followed by another dry day, P_{00}). These results appear loosely consistent with previous statistical climate change impact studies in the region, and might be physically interpreted as suggesting a gradual increase in the local typical duration of a Pacific frontal storm during hydrologic winter, with no systematic trend in the average duration of a dry-day interlude. Additionally, the probability of any day-to-day precipitation state transition (from wet to dry, or from dry to wet), P_{ST}, has been tentatively interpreted to exhibit an area-wide negative long-term trend, suggesting an overall increase in precipitation memory. The findings provide some additional regional context for several issues in hydrometeorological modelling, climatology, and environmental impact assessment.

Résumé
Nous avons mis au point des modèles de Markov du premier ordre à deux états pour un seul site pour l'occurrence des précipitations quotidiennes pour chaque saison de pluies hivernales durant la période historique de relevés à cinq stations météorologiques à long terme dans la vallée du bas Fraser de la Colombie-Britannique, au Canada. Nous avons ensuite évalué les tendances temporelles monotones dans les éléments indépendants des matrices de transitions. Bien que les résultats demeurent préliminaires, il y a des indices d'une tendance négative à long terme cohérente à l'échelle de la région dans la probabilité des transitions de l'état humide à l'état sec, P_{10} (ou une tendance positive dans la probabilité qu'un jour humide soit suivi d'un autre jour humide, P_{11}). En revanche, on ne trouve pas d'indice d'une tendance coordonnée et cohérente à l'échelle régionale dans la probabilité des transitions de l'état sec à l'état humide, P_{01} (ou, par conséquent, dans la probabilité d'un jour sec suivi d'un autre jour sec, P_{00}). Ces résultats semblent s'accorder jusqu'à un certain point avec des études statistiques précédentes sur les répercussions du changement climatique dans la région et pourraient physiquement s'interpréter comme suggérant une hausse graduelle dans la durée caractéristique locale d'une dépression frontale du Pacifique durant l'hiver hydrologique, sans tendance systématique dans la durée moyenne d'un intermède de jours secs. De plus, la probabilité d'une transition d'état de précipitations quelconque (d'humide à sec ou de sec à humide) d'un jour donné au jour suivant, $P_{TÉ}$, a été provisoirement interprétée comme affichant une tendance négative à long terme dans l'ensemble de la région, ce qui suggère une augmentation générale durant la période de données de précipitations. Les résultats fournissent un certain contexte régional supplémentaire pour plusieurs problèmes de modélisation hydrométéorologique, de climatologie et d'évaluation des conséquences environnementales.

Request for comments on a proposal:

A Research Consortium in Atmospheric and Related Sciences

Text in italics prepared by Paul Myers, CMOS President 2007-08, pmyers@ualberta.ca

Recently some discussion has been held about the possibility of forming a research corporation in atmospheric (and related) sciences, based upon the model of UCAR in the United States. Following a discussion at the past CMOS congress in St. John's, Charles Lin of Environment Canada forwarded a short discussion paper on this idea to CMOS, asking for comments. CMOS has posted this document on its web site, asking for comments from members so that the society executive can provide an informed choice.

I view ocean sciences as a related discipline to atmospheric sciences and thus would hope that if anything comes out of these discussions, oceanography is also involved. I would urge readers of the CMOS Bulletin SCMO

to comment on the proposal and especially the broadening of any such consortium to include oceanography and ocean sciences..

The proposal briefly described below was discussed at a "Town Hall" meeting held 4:30 pm 5:30 pm May 31, 2007 at the Delta Hotel in St. John's, Newfoundland (during the 2007 CMOS/CGU/AMS Congress). A brief but wide-ranging discussion was held but no conclusions were reached. The committee looking into the matter feels that it would be useful and in fact necessary to solicit additional input from members of the broader community before proceeding further. In that vein CMOS members are encouraged to consider the matter and submit their comments to the CMOS Executive, c/o the Executive Director, at exec-dir@cmos.ca. with a view to coming up with a CMOS position on the matter.

Preamble
The Atmospheric Science and Technology Directorate of Environment Canada (EC) organizes an annual meeting of the Heads and Chairs of university departments in Canada engaged in atmospheric and related research. At a recent meeting (April 11, 2007), the idea of a "Canadian UCAR (University Corporation for Atmospheric Research)" was discussed. There was sufficient interest to have a committee examine this further. The committee consisted of Charles Lin (Chair), Don MacIver, Ann McMillan (all of EC), James Drummond (Dalhousie University and University of Toronto), John Gyakum (McGill University) and Theodore Shepherd (University of Toronto). A recommendation was to hold a Town Hall at the St. John's CMOS/CGU/AMS Congress to have a wider discussion.

Concept
A research consortium consisting of Canadian university and/or government laboratories engaged in atmospheric and related sciences.

Rationale

■ There is little opportunity for representatives of university departments to meet regularly to discuss issues of common interest.

■ Earth System Science is becoming increasingly important, and the consortium would facilitate research and training in this area.

■ There already exists significant university-government collaborative initiatives, such as the collocation of the Canadian Centre for Climate Modelling and Analysis (CCCma) and the University of Victoria; the Canadian Network for the Detection of Atmospheric Change (CANDAC); the Canadian SPARC (Stratospheric Processes And their Role in Climate) program; and the Adaptation and Impacts Research Division (AIRD) of EC. Inclusion of government laboratories in the consortium would further promote this synergy and facilitate technology transfer from universities to EC for the public good of Canadians.

■ In view of research funding pressures faced by both universities and government laboratories, the consortium would explore new models of funding (e.g., UK's Natural Environment Research Council, NERC) and doing collaborative research (e.g., a "Canadian NCAR" or a network of environmental research centres across Canada).

■ Outreach and communication would be improved as a result of the consortium through sharing of expertise and improved coordination.

Demande de commentaires concernant une proposition:

Un consortium de recherche en sciences atmosphériques et connexes

Le texte en italique a été préparé par Paul Myers, Président de la SCMO 2007-2008, pmyers@ualberta.ca

Récemment, des discussions ont eu lieu concernant la possibilité de former une corporation de recherche en sciences atmosphériques et connexes, basée sur le modèle de l'UCAR aux États-Unis. Suite à une discussion au dernier congrès de la SCMO à St. John's, Charles Lin d'Environnement Canada a fait parvenir un court document de travail sur cette idée à la SCMO, en sollicitant des commentaires. La SCMO a affiché ce document sur son site Internet, sollicitant les commentaires des membres afin que le dirigeant de la société puisse offrir un choix informé.

Je considère l'océanographie comme une discipline reliée aux sciences atmosphériques et ainsi j'espérerais que si quelque chose sort de ces discussions, l'océanographie soit aussi impliquée. Je demande donc aux lecteurs du CMOS Bulletin SCMO de nous donner des commentaires sur l'élargissement d'un tel consortium en incluant l'océanographie et les sciences océaniques.

La proposition décrite brièvement ci-dessous a été discutée à l'assemblée publique du 31 mai 2007 de 16:30 à 17:30 au Delta Hotel de St. John's, Terre-Neuve (durant le congrès SCMO/UGC/AMS 2007). Une discussion brève mais élargie s'est tenue mais aucune conclusion n'a été dégagée. Le comité qui examine la question croit qu'il serait utile et en fait nécessaire de solliciter les commentaires supplémentaires des membres de la collectivité au sens large avant de poursuivre la démarche. Dans cette optique, les membres de la SCMO sont encouragés à considérer la question et soumettre leurs commentaires au directeur de la SCMO, a/s du Directeur général, au exec-dir@cmos.ca. afin d'en arriver à une position de la SCMO sur la question.

Préambule
La Direction générale des sciences et de la technologie atmosphérique d'Environnement Canada (EC) organise une rencontre annuelle des chefs et présidents de départements universitaires au Canada qui sont engagés dans la

recherche en sciences atmosphériques et connexes. Lors d'une récente rencontre (11 avril 2007), l'idée d'un UCAR canadien (Corporation universitaire pour la recherche atmosphérique) a été discutée. Il y avait suffisamment d'intérêt pour qu'un comité examine cette question plus en profondeur. Le comité est composé de Charles Lin (président), Don MacIver, Ann McMillan (tous d'EC), James Drummond (Dalhousie University et University of Toronto), John Gyakum (McGill University) et Theodore Shepherd (University of Toronto). On a recommandé la tenue d'une assemblée publique au congrès SCMO/UGC/AMS de St. John's afin d'avoir une discussion plus élargie.

Concept
Un consortium de recherche consistant en des laboratoires d'universités canadiennes et/ou du gouvernement engagés dans la recherche en sciences atmosphériques et connexes.

Exposé rationnel

■ Il y a peu d'occasions pour les représentants des départements universitaires de se rencontrer régulièrement afin de discuter de questions d'intérêt commun.

■ La science du système de la Terre devient de plus en plus importante, et le consortium faciliterait la recherche et la formation dans ce domaine.

■ Il existe déjà des initiatives de collaboration université-gouvernement significatives, telles que le regroupement des services du Centre canadien de la modélisation et de l'analyse climatique (CcmaC) et ceux de la University of Victoria; le Réseau canadien pour la détection des changements atmosphériques (RCDCA) ; le programme SPARC canadien (Processus stratosphériques et leur rôle dans le climat); ainsi que le Groupe de recherche sur les impacts et l'adaptation (GRIA) d'EC. L'inclusion des laboratoires du gouvernement dans le consortium ferait davantage la promotion de cette synergie et faciliterait le transfert de technologies des universités à EC pour le bien collectif des Canadiens.

■ En vue des pressions du financement de la recherche auxquelles font face les laboratoires des universités et du gouvernement, le consortium explorerait de nouveaux modèles de financement (par ex. : le Natural Environment Research Council, NERC, du Royaume-Uni) et de recherche coopérative (p. ex. : un UCAR canadien ou un réseau de centres de recherche environnementale à travers le Canada).

■ La diffusion et la communication seraient améliorées grâce au consortium par le partage de l'expertise et une meilleure coordination.

Cape Breton Weather Watching for the Naturally Curious

by Bill Danielson

Cape Breton University Press, 202 pages
$28.95 soft cover
ISBN 1-897009-13-5

Book reviewed by Rick Danielson[1]

Cape Breton Weather Watching is Bill Danielson's fourth meteorology text, but the first to highlight the east coast locale where he and his wife Esther live. It also showcases the amazing result of their presence there: photographs and descriptions that captivate both lay and science-minded readers alike. In this text, Bill Danielson neither shies away from the mundane ("mud, just mud" is the caption of one springtime photo), nor avoids difficult topics (like future climate in Cape Breton). This is a glowing guide to a region's atmospheric phenomena.

The distinctive combination of factors that drives Cape Breton weather is the topic of the first chapter. Its position relative to the semi-permanent highs and lows, the seasonal influence of the Gulf of St. Lawrence, and the contrasts of its coast and Highlands are all introduced. The next four chapters focus on each of the four seasons in turn. There are suggestions for weather watching at the end of each chapter, and this provides a nice review of the material covered. The text is also peppered with interesting anecdotes, such as the relief that Alexander Graham Bell found in Cape Breton summers, and an explanation of "going down north" (referring to sailing downwind, from the days when the boat was the main mode of transportation).

Early chapters provide a good indication of the weather phenomena to look for in each season. An explanation of air masses, storm tracks, cyclones, hurricanes and frontal models are all provided for context. The middle chapters explain phenomena such as the blue sky and sea, the sun on the horizon, and the interplay of light and precipitation. There, the photographic sensibilities and meteorological expertise of the author are equally applied to reveal the beauty of scattering and polarization. For example, the explanation of why a blue sky looks brighter and the ocean darker on the horizon is revealing. Another notable explanation is given for the green flash and how to find it. The reader is also challenged to find the fogbows, moonbows, aurora, haloes and coronas of Cape Breton. Seasonality in the occurrence of mirages is also fully described.

The reader discovers that the Mi'kmaq name for Cape Breton is Unama'ki (land of fog). An ample explanation for fog and clouds of all kinds are given later in the text, where there's no lack of humor either (upslope fog is Cape North Mountain's moustache). Throughout the text, satellite pictures do a great job of supplementing those of the author. The final chapters are on rain, snow, wind watching and climate. There are interesting descriptions of why foam is found along rivers in spring and especially how the famous Suete winds form. (Danielson notes the strongest event of 126 knots was associated with the Storm of the Century!)

The text is properly self-contained and includes a detailed map in the preface for readers not familiar with this Nova Scotian island. Appendices include internet references, climate data, and sunrise and sunset tables. There is even some information about atmospheric tides and how to take meteorological observations. The entire text is a stunning visual accomplishment. It invites and challenges the reader to perceive the weather in all its glory. It also provides some real-time cues about how the weather is going to change. In a place where such changes can happen quickly, both residents and visitors of Cape Breton alike may enjoy learning more!

Introduction to Coastal Dynamics and Shoreline Protection

by G. Benassai

2006, WIT Press, Billerica, MA, USA
ISBN# 1-84564-054-3; Price $US 195
Hardcover, 331pages

Book reviewed by Charles Schafer[2]

According to the author, this book is intended for the training of both students and practising engineers. As such, its fifteen (15) chapters cover both environmental sciences and coastal engineering topics with a focus on sandy European coastlines. Its content can be subdivided into three parts. Chapter 1 offers an overview of the subject aimed at developing basic ideas needed to address integrated coastal zone management (CZM) problems (e.g., erosion, remediation, management). Chapters 2-11 consider various *meteomarine* factors (e.g., waves, currents, sediment transport) and chapters 12-15 address shoreline protection

[1] CMOS Member, Dalhousie University, NS.

[2] Bedford Institute of Oceanography, Dartmouth, NS, B2Y 4A2

systems and basic elements of hydraulic and structural designs for *controlling coastal behaviour* for both conservation and infrastructure development reasons.

A large part of Chapter 1 is presented in point form. It considers a number of subjects that are critical to an integrated approach to coastal management *design.* The chapter addresses topics such as data acquisition and sources, critical erosion evaluation, space and time scale considerations, *meteomarine* factors, inter-relationships between sediment transport and coastal structures, and elements of CZM. Benassai's development of space and time scales analysis is particularly refreshing because it ensures that both local and regional characteristics of coasts are given equal attention in evaluating coastal processes on time scales of days to decades. The section on CZM stresses the importance of a transnational approach for countries that lie adjacent to *regional seas* i.e., a strategy that is particularly aimed at European coastal states. The author argues that the planning and management of coastal zones must necessarily be founded *on the so-called principle of precaution* (a philosophy that must be closely tied to an in-depth knowledge of related economic implications).

The first part of Chapter 2 defines beaches with respect to their sediments, morphology, classification evolution, and energy-based classification. It is followed by a concise description of the features of various coastal elements and a quantitative assessment of the beach equilibrium profile concept. The next section explores sediment analysis subjects and offers a sediment sampling strategy that emphasizes the importance of temporal and spatial variability of beach environments. Later parts of this chapter treat grain-size analysis methods and summarize some of the pitfalls of sieve analysis. It concludes with a utilitarian case study that takes the student through an example calculation of statistical moments (e.g., mean and standard deviation of a grain-size distribution data set). Chapters 3-8 treat various aspects of wave theory (e.g., linear wave analysis, sea level variability, wave measurement, analysis and prediction, long-term wave statistics, and wave transformation in the coastal zone). The approach is quantitative and presumes that the reader is reasonably well grounded in engineering mathematics and notation. Chapter 3 is structured to provide an introduction to linear wave theory. It focusses on small amplitude wave theory which is characterized by a basic assumption that wave height is much smaller than both wave length and *still water* depth. This approach reduces the values of non-linear boundary conditions to negligible amounts in relation to the linear terms that are used to describe a wave's motion. Chapter 4 examines sea level variability with respect to astronomical, *meteo-oceanographic* and tectonic factors. It provides useful discussion and a quantitative treatment of tides, long waves or (e.g., tsunamis and seiches - i.e., waves that develop when an enclosed body of water is shaken), wave set-up and set-down (i.e., the evaluation and depression of mean sea level due to wave breaking), and storm surge. The author cautions that a tsunami rarely crashes ashore in one large wave. A series of waves, that are often preceded by coastal flooding followed by a recession of coastal waters, can be the most dangerous feature of the wave.

Chapters 5 through 8 provide comprehensive and quantitative overviews of wave measurement and analysis, short-term wave prediction, long-term wave statistics, and details on wave transformation in the coastal zone. Within these four chapters, the reader will discover practical information on various types of monitoring instrumentation (e.g., pressure gauges and buoys), wave measurement networks, data sampling techniques, time domain analysis, wave hind-casting and prediction, spectral wave models, long-term wave prediction, the statistics of offshore extreme waves and the key aspects of wave transformation in the coastal zone (e.g., energy flux, refraction, slowing, reflection, and diffraction). A good part of Chapter 8 is devoted to an excellent review of various numerical models for determining wave propagation. Chapters 9 through 11 are devoted to sediment transport, beach profile modelling and shoreline modelling. In this section of the book, the student/practitioner is taken through the basic concepts of sediment transport. Special attention is paid to non-linear phenomena such as the mean transport of water toward the shoreline, i.e., mass transport.

Chapters 12 through 15 present the various engineering aspects of coasts. Their emphasis is on coastal protection methodologies, hydraulic and structural design, and on beach management strategies. Chapter 12 details the design and placement of breakwaters and groins. It also includes an analysis of the advantages and disadvantages of the various protection systems (e.g., longitudinal, cross-shore and *soft* protection systems) and links them to various technical, economic and environmental considerations. The treatment is comprehensive and the author has attempted to summarize shore/beach protection options using several tables that have been seemingly(?) "dropped in" at the end of the chapter. Hydraulic design analysis considers the processes that occur when waves interact with a presumably artificial rock slope. In Chapter 13, the author reviews basic calculations of the main hydraulic response parameters (e.g., wave run-up and run- down, over-topping, wave transmission, and wave reflection). Benassai cautions that, as a consequence of limited test data, contemporary prediction methods are only suitable to calculate hydraulic responses for a few specified cases. Structural design considerations are covered in Chapter 14. It begins with a section that details the response of a protective structure in relation to various hydraulic loads and then goes on to offer some basic rules for the geometric design of breakwater cross-sections. The next part of the chapter describes two formulas for the prediction of the rock size of armor units subject to wave attack i.e., the Hudson and Van der Meer formulations. The remainder of Chapter 14 is devoted to an analysis of various breakwater types with reference to the two aforementioned formulas and with respect to specific features of breakwaters (e.g., filter and core construction characteristics, toe stability, etc.). In the final chapter of the

book (Chapter 15), the author describes the engineering aspects and methodologies of beach nourishment (e.g., benefits to the shoreline, volume computations, longevity, and compatibility of borrow material). It concludes with Benassai's perspective on sediment sources for beach nourishment and on monitoring the spatial and temporal behaviour of nourished beaches.

As a desktop reference, this publication will likely be of greater value to coastal engineers than to coastal oceanographers. However, its integration of oceanographic and engineering principles, the inclusion of utilitarian case studies, and its fifteen-page references section should be of value to students of both disciplines despite the sparse number of post-2000 references. The text itself suffers from several shortcomings. For example, sentence construction and wording have obviously not received adequate editorial attention in many instances (e.g., Chapter 12). In addition, the absence of explanatory captions and legends for several figures and tables detracts from their effectiveness in complementing the subject matter under discussion. There are also several other obvious editorial oversights such as the use of the divide symbol (÷) instead of a dash (-) to indicate distance factor ranges, and the printing of tables using a font size that cannot be easily resolved by the printing method used (e.g., Table 13.4). I was particularly disappointed by the low number and poor reproduction quality of the photographs used in the book and was also somewhat surprised that this otherwise comprehensive work was published without a subject index. I don't think I would be prepared to spend the US$195.00 for an office copy; however, I would be inclined to recommend it as a useful addition to my institute's library.

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.

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.

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Andrej Saulesleja

1948 - 2007

Andrej Saulesleja passed away in hospital shortly after visits from his family on August 19. Andrej is loved by his wife Anna Setrakian, his mother Valija, sons Eric (Wendy) and Peter (Tracey), step-daughters Lena and Christine and granddaughters Karen, Jillian, Allison, and Lindsay. He is survived by his half-sister Margaret (Oswald) of Latvia. He is predeceased by his first wife, Glenda and father, Kristaps. He will be missed and fondly remembered by his extended family and friends. Donations to the Canadian Cancer Society are welcomed.

Remembering Andrej

We have many fond memories of our times with Andrej and his family. We first got to know Andrej, Glenda, Eric and Peter in Edmonton in 1973 when Andrej and I both did a qualifying year at the University of Alberta in honours mathematics and physics in preparation for the following two-year MSc Meteorology program at the same university. Andrej had previously worked as a meteorological officer at Canadian Forces Base Chatham, New Brunswick and prior to that had graduated from Meteorologist (BSc) Course 26 / Unit IV in 1970. We both completed our MSc degrees in June of 1976 when Andrej took a job in Halifax and I went to the headquarters of the Atmospheric Environment Service in Toronto (Downsview). We were able to resume our friendship in the late 1970s when Andrej took a position in the Hydrometeorological and Marine Applications Division at the Downsview Headquarters and moved to King City, north of Downsview. We lived not too far away in the same township (King). After Heather and I moved from the Toronto area to Switzerland in 1993, we enjoyed several visits with Andrej and Glenda when Andrej came to work at the WMO Secretariat in Geneva as a consultant, once in the late 1990s, after Andrej retired, working for me in the World Climate Data and Monitoring Program Division. After retiring to the west coast in December 2000, Heather and I had an enjoyable visit with Andrej and Glenda in September of 2001. The last time we saw Andrej and our first opportunity to meet Anna was during their visit to our home and cabin in November of 2005.

We admired Andrej's devotion to his family, especially during the years of Glenda's failing health and enjoyed his sense of adventure and marvelled at his ability to adapt to new situations and technologies. Our sympathies are with Anna and the surviving members of Andrej's family who suffered the loss of Glenda last November and now Andrej.

Peter and Heather Scholefield
West Vancouver, BC.

Diane V. Michelangeli

1962 - 2007

Professor Diane Michelangeli died Aug 30, 2007 at age 45. She had been suffering from metastatic cancer for the past few years, fighting every step of the way, having encouraging periods of remission but finally succumbing to a series of brain tumours. She was an associate professor at the Department of Earth and Space Science and Engineering at York University.

Diane earned her degrees in Chemistry and Space Science from McGill and the California Institute of Technology. She joined the Faculty of Science and Engineering at York in 1999 as a holder of a University Faculty Award and Professor of Atmospheric Science. She also became a valued member of both the Centre for Research in Earth and Space Science (CRESS) and the Centre for Atmospheric Chemistry (CAC). Prior to that she had worked at University of Toronto and in local Environmental Consulting companies on issues related to air quality but her real goals were to teach and to carry on her research related to the atmospheres of Earth, and especially, Mars. Winning a highly competitive NSERC University Faculty Award offered her that opportunity.

Diane excelled at and enjoyed teaching, at both the undergraduate and graduate levels. During her years at York, 2 MSc and 5 PhD students have earned their degrees under her principal supervision. It is a great tribute to her dedication that in the past year, while her health was seriously compromised by cancer, she devoted significant efforts to helping her students towards completion of their graduate degrees. In the past year alone, five of her group including 3 PhD students have successfully defended their graduate theses and dissertations.

The Phoenix mission gave Diane the opportunity to play an important role in Mars-related research, and until recently she led the Canadian Science Team for the Phoenix Mars mission as the Principle Investigator for MET. MET is the Canadian meteorological package provided by CSA for this NASA Mars lander project led by the University of Arizona. Phoenix successfully launched towards Mars Aug 4 and is now well on its way. Together with her students and post-doctoral researchers she has developed modelling capabilities that will be essential tools as we endeavour next year to interpret the data that will be acquired by the Canadian MET instruments on the surface of Mars. It is especially sad that she will not be able to see the fruits of this work when Phoenix lands on Mars next May.

Diane leaves behind her husband, Lionel Laroche, daughter Carolyn, age 14 and son Daniel, age 11. Lionel, and Diane's parents (Lois and Antoine) lovingly nursed Diane through the difficult final months of her illness. This has tragically ended her highly productive scientific career at far too early a stage. She will be sadly missed by all of her colleagues at York, by members of the Phoenix team and throughout the scientific communities of which she was a significant part.

The Dr. Diane Michelangeli Memorial Scholarship is being established to provide financial assistance to a female graduate student enrolled in the Science & Engineering programs that Diane was involved with at York University. Contributions can be made to:

Dr. Diane Michelangeli Memorial Scholarship
c/o York University Foundation, West Office Building
4700 Keele Street, Toronto, Ontario, M4J 3J9
Attn: Bruce Logan, Chief Development Officer, Faculty of Science & Engineering

Donations should be made payable to the York University Foundation.

For further information, please contact:

http://www.yorku.ca/yfile/archive/index.asp?Article=9017

Peter Taylor
Graduate Program Director
Earth and Space Science

SHORT NEWS / NOUVELLES BRÈVES

CMOS Member New Vice Chair of IOC

Dr. Savithri Narayanan was elected as the Vice Chair of the Intergovernmental Oceanographic Commission (IOC) during the 24th Session of the IOC Assembly, held from 19 - 28, June 2007. The Intergovernmental Oceanographic Commission of UNESCO was established in 1960 and now has the mandate to "promote international cooperation and to coordinate programmes in research, services and capacity-building, in order to learn more about the nature and resources of the ocean and coastal areas and to apply that knowledge for the improvement of management, sustainable development, the protection of the marine environment, and the decision-making processes of its Member States".

Savithri Narayanan, Vice Chair Canada, Neville Smith, Vice Chair Australia, Cherif Sammari, Vice Chair Tunisia, Javier Valladares, Vice Chair Argentina, Koïchiro Matsuura, Director General UNESCO, Julian Reyna, Vice Chair Columbia and Patricio Bernal, Executive Secretary, IOC.

The Officers of IOC consist of a Chair and five Vice Chairs to ensure representation from all geographical regions. Canada has been a major contributor to IOC and thus to global ocean science and had several Vice Chairs and Chairs in the past. Geoff Holland, Chairman from 1995 to 1999, is still an active participant in IOC even after his retirement from DFO.

Savi holds a doctorate degree in applied mathematics (1973) from Harvard University. Savi has had a rich and diverse career in ocean sciences in Canada, including researcher, consultant, data manager and senior administrator. Currently in the Department of Fisheries and Oceans she is the Dominion Hydrographer of Canada, and the Director General of Ocean Sciences and Canadian Hydrographic Service. She is also an active member of the CMOS Ottawa Centre.

CMOS Member New Elected President of IAPSO

At the 24th IUGG (International Union of Geodesy and Geophysics) General Assembly, held 2-13 July, 2007 in Perugia, Italy, Professor Lawrence Mysak of McGill University was elected president of IAPSO (International Association for the Physical Sciences of the Oceans), for the 4-year term, 2007-11. He is the second Canadian to hold this position, the first being the late Dr. Robert W. Stewart who was president of IAPSO for the term 1975-79. IAPSO is one of 8 sister associations of IUGG, a non-governmental organization under ISCU (The Internat. Science Council) which meets every 4 years. The last general assembly of IUGG was held in Sapporo, Japan in 2003, and the next general assembly will be in Melbourne, Australia in 2011. Other associations in IUGG of related interest to IAPSO are those focussing on atmospheric sciences (IAMAS), hydrology (IAHS) and cryospheric sciences (IACS).

Dr. Lawrence Mysak: New President of IAPSO

During 19-29 July 2009, IAPSO together with IAMAS and IACS will hold a 10-day joint assembly in Montréal, which is expected to attract up to 2000 delegates from around the world. Professor Mysak is currently serving on the organizing committee for this meeting; the chair of this committee is Dr. Michel Béland of Environment Canada.

RADARSAT-2: Supporting Marine Management

The RADARSAT-2 satellite, to be launched later this year, will support marine operations and oil spill monitoring, ice services, agricultural and ecosystem monitoring, Arctic and remote-area surveillance emergency and disaster response. A RADARSAT-2 Symposium was held in September 2006 to review the satellite's technological advances and configuration, access to data, and industrial policy and markets. For information on obtaining the presentations, access http://www.space.gc.ca/asc/eng/events/2006/radarsat2.asp.

New "Ice Graph" tool to visualize Ice Cover variability

A new tool to visualize ice cover variability in Canadian waters is now available on Environment Canada's Canadian Ice Service (CIS) web site. The **Ice Graph** tool allows users to quickly generate ice cover graphs for a number of pre-defined areas in Canadian waters including the Northwest Passage. The tool uses summarized ice cover data (by ice type for each of the predefined areas) produced from the CIS Regional Charts from 1968 to present. The output product is a series of bar graphs depicting ice cover variability and trends based on user input. The **Ice Graph** can be accessed from the CIS Ice Archive web page or directly from the direct link shown below: http://www.ice.ec.gc.ca/IceGraph/IceGraph-GraphdesGlaces.jsf?id=11874&Lang=eng

Nouvel outil "Graphe des Glaces" pour visualiser la variabilité du couvert de glaces

Un nouvel outil pour visualiser la variabilité du couvert de glaces dans les eaux canadiennes est maintenant disponible sur le site web du Service canadien des glaces (SCG) d'Environnement Canada. L'outil **Graphe des Glaces** permet à l'usager de produire rapidement des graphes de couvert de glaces pour plusieurs secteurs prédéfinies dans les eaux canadiennes incluant le Passage du Nord-ouest. L'outil utilise un sommaire de données de couvert de glaces (par type de glace pour chacune des régions prédéfinies) produit à partir des cartes Régionales du SCG de 1968 à nos jours. Le produit de sortie est une série de diagrammes de barres illustrant la variabilité et les tendances du couvert de glaces basées sur les entrées de l'utilisateur. Le **Graphe des Glaces** est accessible depuis la page web Archives des glaces du SCG ou directement à partir du lien ci-dessous: http://www.ice.ec.gc.ca/IceGraph/IceGraph-GraphdesGlaces.jsf?id=11874&lang=fre

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United Nations Environment Programme's Montréal Protocol Innovators Award

Environment Canada scientists Jim Kerr and Tom McElroy, along with David Wardle, will receive the United Nations Environment Programme's Montreal Protocol Innovators Award during the 20th anniversary celebrations of the Montréal Protocol. Introduced in 1987, the Montréal Protocol is the international agreement prompting action against the depletion of the ozone layer. 191 countries have since ratified the Protocol and Canada has played a key role in the agreement's remarkable achievements. The award winners scientific breakthroughs had a significant impact on the way that Canada, and the world, understands the issue of ozone depletion.

Prix de l'innovation du Protocole de Montréal décerné par le Programme des Nations Unies

Les scientifiques d'Environnement Canada, Jim Kerr et Tom McElroy, ainsi que David Wardle, recevront le Prix de l'innovation du Protocole de Montréal décerné par le Programme des Nations Unies pour l'environnement lors des célébrations soulignant le 20e anniversaire du Protocole de Montréal. Instauré en 1987, le Protocole de Montréal est l'accord international visant à adopter des mesures contre l'appauvrissement de la couche d'ozone. Depuis, 191 pays ont ratifié le protocole, et le Canada a joué un rôle clé dans les remarquables réalisations découlant de l'accord. Les percées scientifiques des lauréats ont eu des répercussions considérables sur la façon dont le Canada, et le reste du monde, comprennent la question de l'appauvrissement de l'ozone.

Our Warming Planet

The atmospheric, oceanographic and cryospheric research communities are welcomed to the 2009 IAMAS, IAPSO and UCCS Joint Assembly to be held in Montréal, Québec, Canada, July 10 - 29, 2009.

Members of the National Organizing Committee are:

• Michel Béland, Environment Canada, Chair;
• Jacques Derome, McGill University, Scientific Program Coordinator;
• Pierre Dubreuil, Executive Secretary;
• Laurier Forget, National Research Council Canada, Assembly Director;
• Charles Lin, IAMAS, Environment Canada;
• Scott Munro, UCCS, University of Toronto;
• Lawrence Mysak, IAPSO, McGill University; and
• Kim Schmidt, Fisheries and Oceans Canada.

For more information, please consult www.iamas-iapso-uccs-2009-montreal.ca. Please send enquiries by e-mail at montreal2009@nrc-cnrc.gc.ca

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Quadrennial Report of Physical Oceanography Research in Canada for the Period 2003-2007

A review of physical oceanography research in Canada for the period 2003-2007 has been completed by Dr. Bill Crawford (Institute for Ocean Sciences) and Dr. Blair Greenan (Ocean Sciences Division, BIO). This report is part of the Canadian contribution to the International Association for the Physical Sciences of the Ocean (IAPSO) on the occasion of the meeting of the International Association of Geodesy and Geophysics (IUGG) in Perugia, Italy in July 2007. Previous reports have been prepared at four-year intervals to coincide with quadrennial IUGG meetings. Drs. Crawford and Greenan are the national representatives of the International Association for the Physical Sciences of the Oceans (IAPSO, http://www.olympus.net/IAPSO/). The report examines Canadian contributions to physical oceanography, ranging from small-scale mixing to regional research projects and global-scale programs such as the International Argo Project. The report is available through the Canadian National Committee for SCOR web site at: Canadian IAPSO Report for 2003 - 2007 The 53-page report, including a substantive list of references, is organized as follow:

Global Ocean

International Argo Project; Global Scale Modelling; Climate Dynamics; Abyssal Flows; El Niño-Southern Oscillation (ENSO); IPCC 4th Assessment Report; Other Global Studies.

Arctic

Climate Variability; Arctic Throughflow; Sea Ice; Contaminants Transport; Carbon Cycle and Ecosystems.

Pacific Ocean

Northeast Pacific Ocean; Subarctic Ecosystem Response to Iron Experimental Release; Mesoscale Eddies; Continental Slope and Shelf-slope Exchanges; Continental Shelf Studies; Inshore Waters.

Atlantic Ocean

The Labrador Sea; Application of Satellite Altimetry; Basin Scale Processes; Atmosphere-Ocean Interactions and Surface Waves; Biophysical Processes; Coastal and Nearshore Processes; Gulf of St. Lawrence.

Turbulence and Mixing

Coastal Mixing Induced by Internal Waves; Island Wake Mixing; Turbulence in the Nearshore Zone; Turbulence and Waves in the Laboratory; Intrusions and Double Diffusion; Mixing on the Continental Shelf; Acoustics, Bubbles and Turbulence.

Tsunami Research, References and Internet sites.

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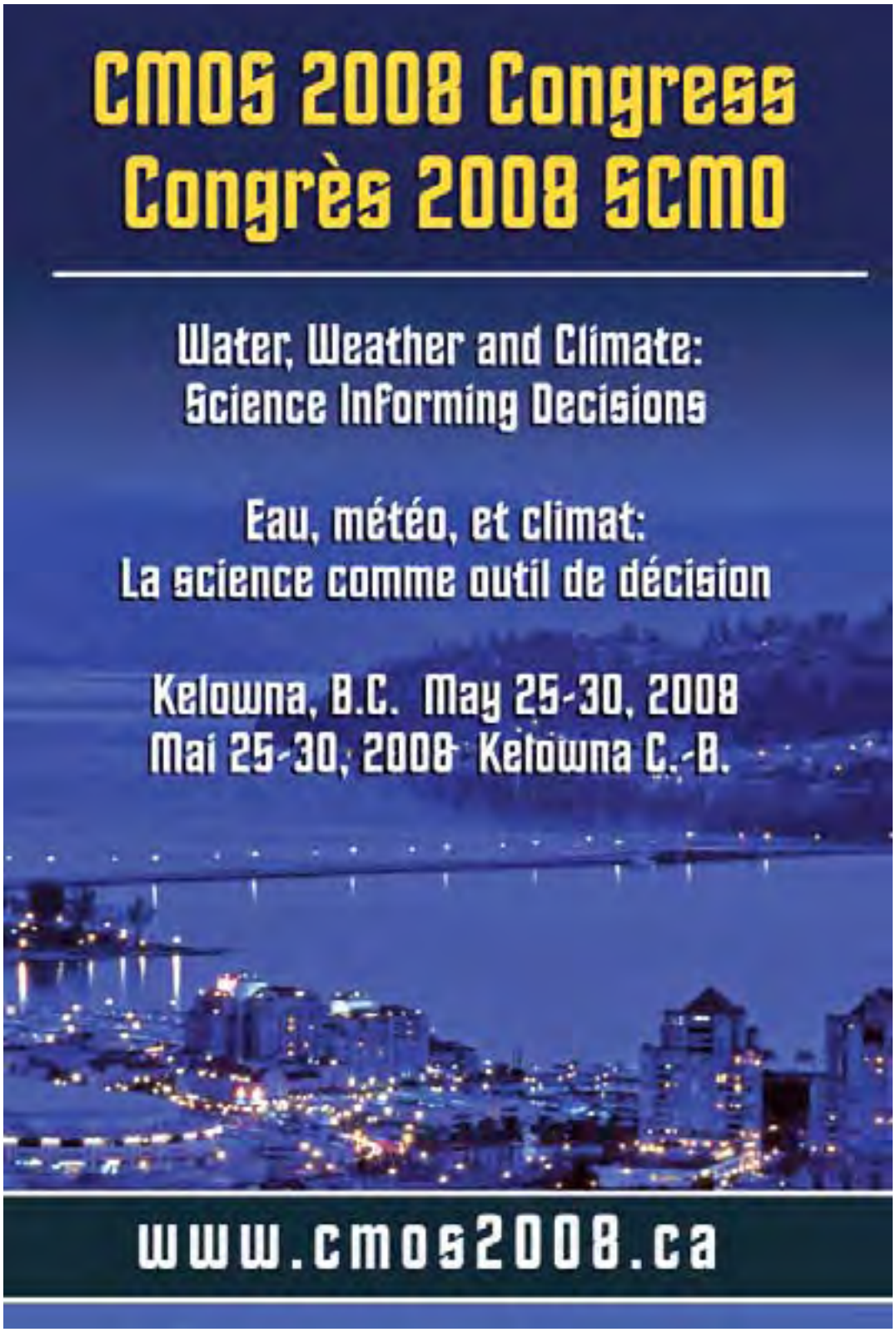
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