



C.M.O.S. NEWSLETTER/NOUVELLES S.C.M.O.

*Canadian Meteorological
and Oceanographic
Society*

*La Société canadienne
de météorologie et
d'océanographie*

JUNE/JUIN 1991 VOL. 19 NO. 3

FOUR CMOS MEMBERS ELECTED FELLOWS OF THE R.S.C.



Dr. Ann E. Gargett



Prof. Timothy R. Oke

Four members of the C.M.O.S. have recently been elected Fellows of the Royal Society of Canada, they are Ann Gargett (Institute of Ocean Sciences, Sidney B.C.), Peta Mudie (Atlantic Geosciences Centre) Tim Oke (University of British Columbia) and Doug Whelpdale

(A.E.S., Downsview). In this issue of the Newsletter we present profiles of the two west coast fellows, and in the next issue 19(4) we will present profiles of the two easterners.
continued next page:-

New F.R.S.C.s (cont)

Dr. Ann E. Gargett

Ann Gargett's analysis of ocean microstructure data from towed instruments, and her own measurements from the submersible Pisces IV have revolutionized our views of turbulence in the ocean. She has collected evidence in support of a vertical mixing rate in the ocean that increases with depth and has brilliantly demonstrated the critical importance of this for the abyssal circulation. She is internationally recognized for the quality and significance of these and other observational and theoretical studies in the difficult but important field of ocean mixing.

Prof. Timothy R. Oke

Dr. Timothy Oke is the world's leading urban climatologist. He has had a dominant role in developing the physical theory that describes this sub-discipline of meteorology and climatology. He has made the pioneer studies of the nature of the energy and water balances of urban areas and how they differ from the surrounding countryside, and developed the first numerical models to simulate urban evaporation rates, heat storage, etc. His algorithms expressing the influence at city size and weather controls are internationally recognized. He has been urban climate rapporteur for the World Meteorological Organisation for 20 years.

EDITOR'S COLUMN

This is the first newsletter by the new editor. Please send any submissions to me at: Institute of Ocean Sciences, P. O. Box 6000, Sidney, B.C. V8L 4B2; Tel. (604)-363-6590; Fax, (604)-363-6746. I expect that a few changes will be noticed in the formatting and styling of the Newsletter, and I look forward to hearing from any readers with comments about any changes. The schedule will remain the same. This issue, volume 19(3) will probably be a little late as I intend waiting for news from the annual Congress in Winnipeg. The next issue will be 19(4), August 1991 and the deadline for the receipt of material will be August 1st. I will be compiling the newsletter in WordPerfect version 5.1, it would be of enormous assistance if submitted material could be mailed on a floppy disc in WP5.1, however, I can convert MS Word files into WordPerfect so please feel free to use MS Word. WordPerfect 5.1 can read HPGL graphics files. Should you wish incorporate graphics in a submitted article this is the most effect way of doing it. (The CMOS logo on the front page of this Newsletter was printed in this way.) Otherwise, please submit clear black-and-white photographs or prints of diagrams, preferably reduced so that they can be pasted directly into a column 3½" or 9 cm wide.

I am please to announce that a well known Canadian scientist, Savonius Rotor, will be touring Canada over the next three years and plans on submitting regular items based on what he happens to notice going on at the various oceanographic and meteorological centres across the country. He has had little time to prepare anything as yet, but a short column is included in this issue. He is fortunate to have the generous assistance of other well travelled Canadian scientists such as Augustus Gast, who is well known to many of us, Daniel DFO and possibly Willie Wave.

WHAT'S GOING AROUND? by Savonius Rotor

I have spent some time reading D.F.O. publications recently, such as the Canadian Journal of something or other, and I wonder why in these days of women's liberation etc., that the Dept. should choose

to place a spermatozoon prominently on the front cover of its publications. Perhaps someone would enlighten me.

At a recent west coast seminar the speaker was discussing the transport of heat in the atmosphere and oceans. As we are all well aware the rather large heat transports involved are usually reported in pettawatts, 1 pW = 10¹⁵ watts. The speaker tried to give some feeling for the general size of 1 pettawatt relating it to Grand Coulee Dams (1 pW = 100,000 Grand Coulee Dams) and jelly doughnuts. One jelly doughnut supplies 250 dietary calories, that is 250,000 real calories = 1 mega joule. Thus if one consumes 10⁹ jelly doughnuts per second, then after arriving at equilibrium (i.e. one stops gaining weight) one will radiate energy at the rate of 1 pw.

I visited McGill University, I note that Dr. Lin will be aiming to keep abreast of WOCE activities during his upcoming sabbatical.

I attended the 25th Annual CMOS Congress, and most enlightening it was too. I transcribed one line from a theoretician's transparency:

$$\delta = \frac{30-40 \text{ m.}}{300-400 \text{ m.}} = 2.0 \cdot 10^{-2}$$

This is presumably a new definition of 2 x 10⁻² of which I was not previously aware.

University of Victoria News by Chris R. Barnes

In February 1991 the Senate of the University of Victoria approved the establishment of a School of Earth and Ocean Sciences (SEOS). Geologists, geophysicists and oceanographers in three other departments have now been brought together in the new School to which several additional faculty will be appointed over the next five years. An undergraduate Earth Sciences Program and M.Sc. and Ph.D. graduate programs have been approved.

Paleobiological and biological oceanographic work is in progress on a wide range of topics and inquiries from prospective graduate students and P.D.F.s are welcomed. Current research interests can be summarized as follows:

Chris Barnes continues work on Lower Palaeozoic conodonts with field work in 1990 and 1991 in Ordovician sequences in the southern Rocky Mountains. Isotope geochemistry on conodonts is being undertaken in collaboration with J. Veizer (University of Ottawa) and B.J. Fryer (Memorial University). Zailiang Ji and Susanne Pohler are involved in post-doctoral conodont research on the lower Ordovician of the Rocky Mountains and Lower Silurian of Anticosti Island, respectively. Marji Johns has begun an M.Sc. project on taxonomy, thermal maturation and geochemistry of mesozoic ichthyoliths from British Columbia.

Rolf Ludvigsen, as an adjunct professor, continues his work on the depositional setting and selected arthropods of the Burgess Shale and is expanding his collections from other Cambrian sequences in western Canada. Rolf has also made recent discoveries of Cretaceous crustaceans on Vancouver Island.

Richard Hebda, an adjunct professor (Royal B.C. Museum), is involved in a wide variety of studies on the Quaternary palynology of British Columbia, the record of recent climate change, and the relationship of changing flora and climate to the archaeological record.

In the area of biological oceanography, Verena Tunnicliffe has a variety of programs underway dealing with benthic communities. Of

topical interest, with the ODP Leg 139 drilling on Juan de Fuca Ridge this summer, is the study of black smoker vent communities. She will be involved in a forthcoming cruise to examine similar faunas on the East Pacific Rise. John Dower is engaged in a Ph.D. study of benthic communities of Cobb Seamount in the northeast Pacific. Another ODP cruise (Leg 145, mid 1992) will investigate the Neogene paleo-oceanographic and paleo-climatic record for which Brian Bornhold (adjunct professor, Pacific Geoscience Centre) and Tom Pedersen (U.B.C.) have been active proponents. Plankton ecosystem dynamics, ocean biogeochemical fluxes and climate change are the focus of work by Ken Denman and Dave Mackas (adjunct professors, Institute of Ocean Sciences). New laboratories for organic geochemistry, especially isotope work, are being developed by Michael Whiticar.

The principal focus of the School of Earth and Ocean Sciences will be in earth system science, and with the integration of paleobiology and biological oceanography, students will be able to compare ancient and modern systems.

Summary of Discussions at the 6th Session of the Canadian National Committee/Canadian Climate Program Research Committee

by Kirk Dawson

The 6th meeting of the Research Committee took place at McGill University on 25th April 1991. It is recalled that this committee provides advice to the Atmospheric Environment Service, the National Research Council and the Canadian Climate program Board on the state of climate research in Canada and on Canadian participation in the World Climate Research Program.

The agenda included discussions on:-

- The Global Climate Observing System (GCOS).
- The Climate Change Detection Project.
- Arctic research.
- Updates on GEWEX, BOREAS, WOCE, Mackenzie and Great Lakes climate impact studies.

With respect to GCOS, the committee was supportive of international efforts to devise and operate such an observing system but that Canada would need to develop a national plan which would assure long-term support for monitoring systems. As a result a task force was struck to develop proposals to address this issue.

The intent of the WMO Climate Change Detection Project is to find some combination of indicators which would conclusively point to trends in the climate. Canada is a leading proponent of the Project and hosted an international meeting in November, 1990 to begin development of a broad, long-term strategy to bring about a successful international endeavour.

The Committee noted the many separate activities/experiments that are planned or underway and focussed on the Arctic; for example, the 1992 Polar Sunrise Experiment (chemistry of the Arctic atmosphere), Arctic Ocean initiatives, and Sea-ice Monitoring Site (co-operative 5 year project with NASA, AES, CCRS and Polar Continental Shelf). It was decided that the next meeting of the group in September 1991 would discuss how to integrate these and other activities dealing with the Arctic.

The Committee was kept abreast of the steady progress being made by Canadian participants in several major international projects, such as GEWEX and WOCE.

Inquiries concerning the work of the Research Committee, or any of the projects identified above, should be made through The Secretariat, Research Committee Program Planning and Liaison, AES, 4905 Dufferin Street, Downsview Ontario M3H 5T4. Tel. (416)-739-4433 or FAX (416)-739-4380.

NEWS FROM CMOS HEADQUARTERS, COUNCIL AND NATIONAL EXECUTIVE

This Newsletter will appear just after the end of the 25th Congress in Winnipeg. The Local Arrangement Committee has worked very hard to make it a success as can be seen from the attractive Program that reached all CMOS Members well before the beginning of the Congress. I hope it will be possible to include a short first report on the Congress and the subsequent Canada-China Mesoscale Workshop elsewhere in this Newsletter.

The National Executive in supporting the Winnipeg LAC's efforts agreed that the Society would provide financial assistance to a number of students and graduate students to enable them to attend the Congress. First priority was given to those that present papers.

The Society has helped organizing a peer review of the Air Quality and Atmospheric Research activities of AES. The review took place during the middle of May.

Dr. Keith Heidorn has taken over as Chairman of the Accreditation Committee from Dr. Tom Low whose term had expired and who had contributed considerably to consolidating and clarifying the accreditation procedures. Accredited Consultant Meteorologists may add now "ACM" and Oceanographers "ACO" after their name. Please urge all colleagues who are qualified and interested to apply for accreditation which has been shown to carry considerable weight with government and the private sector.

Nouvelles du quartier général du Conseil et de l'Exécutif

Ce Bulletin de nouvelles paraîtra immédiatement après la fin du 25ème congrès de Winnipeg. Le comité des arrangements locaux a travaillé très fort pour en faire un succès comme on a pu le constater par le programme intéressant qui a été expédié à tous les membres de la SCMO bien avant le début du congrès. J'espère qu'il sera possible d'inclure dans ce numéro un court rapport préliminaire du congrès ainsi que de l'atelier de travail sur la mésoéchelle du Canada-Chine.

En supportant les efforts du comité des arrangements locaux de Winnipeg, l'Exécutif national est d'accord pour que la Société aide financièrement un nombre d'étudiants et d'étudiantes gradués pour qu'ils puissent assister au congrès. La première priorité a été donnée à ceux qui présentaient une communication.

La Société a aidé à l'organisation d'une révision par les pairs des activités du Service de l'environnement atmosphérique pour la qualité de l'air ainsi que des recherches atmosphériques. La révision s'est tenue au milieu du mois de mai.

Le Dr. Keith Heidorn est devenu le président du comité d'accréditation en remplacement du Dr. Tom Low dont le terme était échu. Le Dr. Low a grandement contribué à consolider et à clarifier les procédures d'accréditation. Les consultants météorologistes accrédités peuvent maintenant ajouter le mot "CMA" et les océanographes "COA" après leur nom. Prière d'informer tous vos collègues qui se qualifient et qui sont intéressés d'obtenir leur accréditation d'appliquer car l'expérience a démontré que ceci avait une importance considérable avec le gouvernement et le secteur privé.

WOCE NEWS

North Atlantic Modelling

by Richard Greatbatch

Memorial University, St. John's, Newfoundland

A combination of funding from WOCE and the OPEN Network of Centre of Excellence has been used to buy a Silicon Graphics Power Center computer and two Turbo-Graphics Personal Iris computers. This means that modelling studies that include the three-dimensional density field are now possible. As part of WOCE, we shall be developing a two-density layer model of the North Atlantic for variability studies and also a three-dimensional circulation model of the Labrador Sea. It is also hoped eventually to develop a 3-D circulation model (coarse resolution) of the North Atlantic. We shall then have a hierarchy of models - a North Atlantic model, a finer resolution Labrador Sea model embedded in the North Atlantic model and finally a model of the circulation on the Newfoundland/Labrador shelf which we are developing for OPEN. The work on the Labrador Sea is the Ph.D. project of Thierry Reynaud at McGill University and is collaborative with Andrew Weaver (Thierry's supervisor at McGill) and Brad de Young. Thierry's first task is to collect together and analyse all available hydrographic data for the Labrador Sea. Hopefully this will tell us something about the 'climatology' of the area. He will then use the analysed density field as input to diagnostic circulation models in an effort to deduce the 'climatological' mean circulation. Once this has been done, work will begin on using prognostic, general circulation type models, using the analysed data fields to provide boundary conditions on the open ocean parts of the model boundaries. A number of different models are available, including the Bryan/Cox GCM and the "long-time-scale, shelf circulation model" that is being developed by Richard Greatbatch and Allan Goulding (Continental Shelf Research, JONSMOD'90 conference issue, in press). The latter is based on similar ideas to the WOCE climate model being developed by S. Zhang at McGill (see article by Charles Lin in previous issue of WOCE NEWS) and uses reduced physics to achieve computational efficiency without sacrificing vertical resolution.

The North Atlantic variability studies form the M.Sc., project of Gus Fanning at Memorial and are collaborative with Syd Levitus at NODC in Washington, D.C., USA. The intention is to develop a two-layer model of the North Atlantic similar to that used by Anderson and Corry, 1985, JPO, 15(6), 773-786. The model will be driven by realistic wind forcing derived from COADS data for the period 1950-1979 and the output compared with the available transport and sea level data. This is a continuation of Gus' B.Sc. Honours thesis project. This involved using the diagnostic model of Mellor et al, 1982, Deep Sea Research, 29, 1171-1192, to deduce changes in the circulation of the North Atlantic between the pentads 1954-59 and 1970-74. Using density data from Levitus, 1989, JGR, 94(C5), 6091-6131, together with wind stress fields calculated from COADS data, Gus calculated the transport streamfunction fields shown in Figure 1. As can be seen, the diagnosed subtropical gyre is

substantially weaker in the later pentad, with the transport of the diagnosed Gulf Stream dropping from roughly 80 Sv in the 1954-59 pentad to roughly 50 Sv in the 1970-74 pentad. Nearly all of this change is attributable to forcing through the JEBAR term in the vicinity of the Mid-Atlantic Ridge. Changes of this magnitude in the transport of the Gulf Stream

Streamfunction ψ

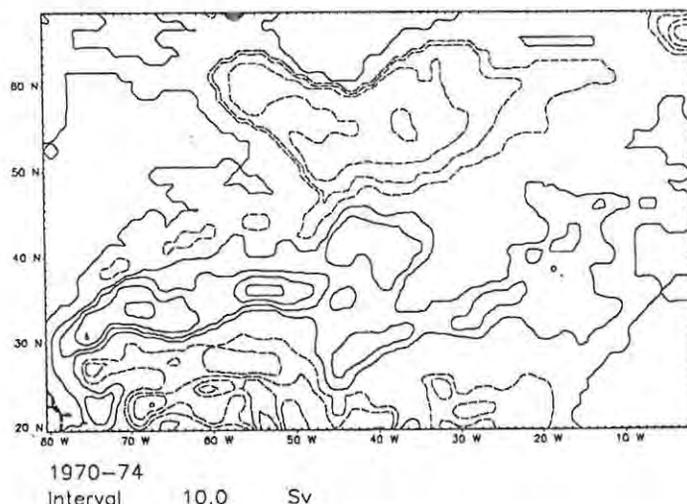


Figure 1:

Model calculated transport streamfunction. The contour interval is 10 Sv, solid contours indicating positive values, dashed contours negative values. The zero contour is not drawn.

have been inferred before using geostrophic calculations relative to 2000m depth (see Worthington, 1977, Nature, 270, 415-417). However, to the best of our knowledge, the calculations we have done are the first to diagnose interannual changes on the basin scale and also do not require the assumption of a "level of no motion". Hopefully, the calculations we plan to do using the two layer model will confirm and also provide some explanation for these diagnosed circulation changes. To study the changes in the thermohaline structure of the North Atlantic noted by Levitus and described in his papers (JGR, 1989, 1990) will require the use of a 3-D circulation model, something which, as noted earlier, we hope eventually to develop.

The two-layer calculations will extend the work of Greatbatch and Goulding, 1989, JPO, 19(5), 572-595, from seasonal to interannual time scales. In a previous article in WOCE NEWS, Brad de Young described work he has been doing analysing hourly sea level data from stations around the North Atlantic. We are thinking of using Greatbatch's and Goulding's model (or a variant thereof) driven by realistic wind forcing in order to interpret this data. We have already done some experiments of this kind to look at variability on the Labrador Shelf at 4, 8 and 12 day periods. The calculations

WOCE NEWS (cont)

suggested that there may be a topographic wave "resonance" with period near 12 days in the Labrador Sea just to the south of Greenland. Ship time has been requested to deploy bottom pressure gauges in an effort to verify this.

In addition to these modelling studies, Richard Greatbatch and Kevin Lamb are interested in finding ways to parameterise the effects of eddies on large-scale circulation. Our first thoughts on this topic appeared in JPO, 20(10), 1634-1637.

Scientific Steering Group Meeting

by Paul H. LeBlond

The University of British Columbia, Vancouver, B.C.

The Scientific Steering Group (SSG) of WOCE gathered at the Bedford Institute, Dartmouth, N.S., for its sixteenth meeting on May 7-9, 1991. The SSG is responsible for the formulation of the WOCE scientific program and for providing scientific guidance for the conduct of WOCE. It is the highest scientific instance of WOCE, co-chaired by Jim Baker (Joint Oceanographic Institutions, Washington) and Allyn Clarke (Bedford Institute). Other members present included Tomás Fonseca (Chile), Vladimir Kamenkovich (USSR), Trevor McDougall (Australia), Worth Nowlin (USA). Others present included John Gould (U.K.) and Peter Saunders (U.K.); Bruce Taft, Peter Koltermann and Bert Thompson from the WOCE International Program Office (IPO); George Needler (WOCE Chief Scientist) and Liz Tidmarsh (SCOR Executive Secretary). Paul LeBlond (Chairman, Canadian National Committee for WOCE, Elsa Traczynski (Canadian WOCE Secretariat) and Dario Stucchi (IOS, Sidney) also attended the meeting.

During its three day meeting, the SSG wrestled with issues related to the various objectives and programs of WOCE, reviewing the status of commitments by participating countries, and the concerns and recommendations from Core Project leaders. A number of specific implementation issues were discussed, such as data sharing, assembling and distribution, the WOCE Hydrographic Program, the promulgation of a WOCE operations manual and methods to promote WOCE.

The SSG also heard four short scientific presentations. Peter Saunders (IOS, Wormley) reviewed the results of the Fine Resolution Antarctic Model (FRAM) regarding heat transport in the South Atlantic, pointing out the importance of resolving eastern boundary currents. Shuba Sathyendranath (Dalhousie University) described her work on the impact of phytoplankton abundance on ocean-atmosphere heat exchange in the Arabian Sea (see also Sea Frontiers, June 1991, p.8). John Lazier (Bedford Institute) presented results from the AR7 repeat section across the Labrador Sea. Peter Koltermann showed some preliminary results from the A9 section across the South Atlantic.

Minutes of the 16th SSG meeting will appear as part of the WOCE documentation series.

WOCE Hydrographic Programme Office Publications

by Dario Stucchi

Institute of Ocean Sciences, Sidney, B.C.

At the recent meeting of the WOCE Scientific Steering Group (SSG-16), held in Dartmouth, Nova Scotia, 7-9 May, the WOCE Hydrographic Programme Planning Committee circulated two WOCE Operations Manuals and announced the existence of a third.

One manual, entitled "Requirements for WHP Data Reporting", describes what cruise information and data the WHP Office requires from the chief scientists and principal investigators, and how and when the data are to be communicated. In order to assemble data from many individual hydrographic cruises into a unified data set, to evaluate their quality, and to report the result, the WHP Office requires, in a unified form, a large amount of information about the cruise and the data collected during the cruise. The manual contains a chapter on the preparation of cruise plans and cruise reports which can be used to alert the WOCE community of opportunities for additional measurements or as a guide to future work in the same, as well as providing the necessary details on the objectives of the cruise and its accomplishments, personnel and contributing institutions, the water sampling methods, and instruments, etc. The manual contains specifications of the data formats, as well as specifications for the type of information and detail required to permit an assessment of the data quality and to fully document how the data were collected and processed.

A second, and as yet incomplete manual, "WHP Operations and Methods", is meant to ensure that the data gathered in the hydrographic programme is of the highest quality. Although the contents of this standards manual are imperfect, it is nonetheless a useful document. The manual is a compilation of contributions from scientists with expertise and knowledge in making particular measurements, calibrations, and processing of hydrographic and tracer data. This draft manual details the standards and calibration procedures of physical and chemical measurements, methods for water sampling (small and large volume), underway measurements and CTD (conductivity, temperature and depth) methods. Publication of this manual is expected in July of 1991. Both this manual and the one described earlier are evolving documents, with improvements to be published in subsequent revisions.

The third report deals with the results of the dissolved oxygen intercomparison cruise completed in 1990. Though not available at the time of the SSG meeting, this report will soon be published and available to the WOCE community. For further information on these publications you may contact WHP Office.

WOCE NEWS (cont)

WOCE PUBLICATIONS

by Paul LeBlond

The University of British Columbia, Vancouver, B.C.

Communication is an essential aspect of the coordination of an international program like WOCE. It is important to keep the participants and the public informed of the progress of the program. There are many kinds of WOCE publications.

National committees put out Newsletters to inform their own community of international activities and, conversely, to make scientists in other countries aware of their own work. A national Newsletter may be incorporated within an existing medium like this one, or may stand on its own. The US National WOCE Committee publishes WOCE NOTES every other month; for (free) subscriptions, write to Therese Schaley, WOCE Notes Office, US WOCE Office, Dept. Oceanography, Texas A&M University, College Station, TX 77843-3146. SIGMA is the UK WOCE Newsletter (Gwyn Griffiths, Editor) James Rennell Centre for Ocean Circulation, Gamma House, Chilworth Research Centre, Chilworth, Southampton, SO1 7N2. Information on other WOCE News will be communicated when available.

The WOCE International Program Office also publishes a WOCE Newsletter out of the WOCE IPO, Institute of Oceanographic Sciences, Deacon Laboratory, Wormley, Godalming, Surrey GU8 5UB, U.K. Other publications from the IPO include reports of meetings of the various WOCE program committees. Recent issues have included:

WOCE Report No. 58/91 WOCE Surface Layer Program.

Meeting Report (19-21 Feb 1990), Jan 1991

WOCE Report No 59/91. Numerical Experimentation Group.

Report of the Fifth Meeting. Feb 1991.

WOCE Report 60/91 Workshop on Global Modelling. Feb 1991

Some of the WOCE Reports are also published as World Climate Research Program reports. For example:

WOCE Report No 46/90. Flow statistics from long-term current-meter moorings: the global data-set in January 1989. is also WCRP-30. The Canadian WOCE Secretariat keeps copies of all these documents. Copies for personal use should be requested from the IPO or other originators.

Erratum:

Through an editorial oversight we forgot to include Bob Gershey's name as the second author of the article with John Lazier on "The

Labrador Sea Line - July 1990" published in February 1991. Bob Gershey was responsible for the chlorofluorocarbon and carbon tetrachloride measurements plotted in Figure 3. With apologies Bob!

NEW CMOS MEMBERS NOUVEAUX MEMBRES DE LA SCMO

These new members were approved May 1st 1991

Mr Zivorad Radonjic (regular)	Toronto
Ms Jean Van Dusen (regular)	Toronto
Mr Zhanqing Li (student)	Montréal
Mr Austen M. Oake (regular)	Halifax
Dr Christopher R. Barnes (regular)	Vancouver Island
Dr Helge Skåtun (regular)	Rimouski

Meteomedia/The Weather Network
(attn. Ian Miller - corporate) Montréal

NOTE TO CENTRES AND CHAPTERS:

It is important that you make contact as soon as possible with any new members in your area to verify their mailing address and to begin distribution of local Society material. National mailings and publications begin once approved new members are entered in the office computer. This follows the date of the Executive or Council meeting shown at the beginning of this notice

Newsletter Information

The CMOS Newsletter is published 6 times per year, contributions are welcome. The editor would like to carry letters, reports of activities at CMOS centres and reports from departments of meteorology and/or oceanography. The newsletters are dated February, April, June, August, October and December and the deadline for the receipt of material is the first day of each of these months.

Advertisements will be carried, the rates are as follows:-

<u>Advertisement Type</u>	<u>Full Page</u>	<u>½ Page</u>	<u>¼ Page</u>
Commercial **	\$150.00	\$80.00	\$50.00
Position vacancy	\$100.00	\$60.00	\$40.00
Employment wanted	---Free to Members only---		

** Corporate and sustaining members advertisements are charged at the Position Vacancy rate.

Rates are based on black and white camera-ready copy. Sizes (inches) are:- Full Page (7.5" x 9.5"), Half Page (3.5" x 9.5") and Quarter Page (3.5" x 4.5"). Other charges will apply where typesetting or artwork are required, on a cost recovery basis. Distribution is to CMOS members and, therefore, is approximately 1000 for each issue.

BOOK REVIEW/CRITIQUE

OPERATIONAL ANALYSIS AND PREDICTION OF OCEAN WIND WAVES. M.L.Khandekar. Coastal and estuarine Studies Series, Vol. 33, Springer-Verlag New York Inc., 1989, 214 pp., ISBN 0-387-97150-5.

This is the 33rd volume in the diverse series by Springer-Verlag somewhat loosely connected to coasts and estuaries. The author has taken on the task of compiling the current state of knowledge of ocean wave analysis and prediction, with emphasis on applications to real-time operations - a daunting task for a relatively small volume of 214 pages. After a short introduction in chapter 1, chapter 2 reviews some basics of wave mechanics. Chapter 3 contains an overview of the principal processes of generation, propagation and dissipation. Chapters 4 and 5 are devoted to descriptions of various classes of prediction techniques. Discussion of shallow water models is in chapter 6, validation of models is in chapter 7, specification of the wind in chapter 8 and wave analysis in chapter 9. Concluding remarks are made in chapter 10.

The basics are reasonably well covered in chapter 2, as far as monochromatic waves are concerned, however, the description of a real sea surface in terms of spectral analysis is delayed to chapter 4. My preference would be to have it, as well as the description of other analysis techniques, in this chapter to avoid later digressions. To my mind, the introduction to internal waves serves no purpose in this book. Chapter 3, on generation, propagation and dissipation is very short, but is probably sufficient to remind those who have forgotten the main concepts. Perhaps this would be the chapter for the discussion of wave rays, presently in chapter 6. The remarks about wave dissipation on beaches are of limited validity and are only peripheral interest to the theme of the book.

Chapters 4 and 5, although brief, provide an interesting perspective of the development of deep water wave prediction, starting with the earliest manual of Sverdrup and Munk, and finishing with the third generation WAM model. Numerical wave prediction has advanced to a very sophisticated state, and these chapters provide a reasonable overview for the non-specialist. Occasionally, some descriptions are too concise, but the lists of references are extensive, and, for the most part, are complete. The shallow water propagation of waves is dependent on some ill-defined processes, such as diffraction and dissipation, and is difficult to model. These issues are raised in chapter 6.

The chapter on validation reviews some of the important attempts made to establish the relative accuracies of many of the models; special emphasis is given to the Canadian Atlantic Storms Project (CASP). A wave model is only as good as the wind data supplied to it. Approaches to providing usable winds from forecasts are described in chapter 8, again with emphasis on the CASP experience. Wave products described in chapter 9 focus on the Canadian experience.

From an editorial viewpoint, I was disappointed to see a major publishing house allow use of camera ready copy that is not on an up-to-date word processing package. In addition, the text contains many annoying typographical errors and inconsistencies that should have been caught. The title is somewhat misleading in that

the primary subject is prediction; operational analysis a distant second. All in all, an interesting book for someone already familiar with wind waves but no working actively on wave prediction. Someone starting out in the field would find this book a useful introduction, and it provides a handy compilation of many references.

Michael G. Skafel
National Water Research Institute
Burlington, Ontario.

ADVERTISEMENT

York University, Department of Earth and Atmospheric Science

NSERC Women's Faculty Award Candidates

The Department of Earth and Atmospheric Science at York University (Toronto, Canada) is seeking excellent candidates to nominate for the Women's Faculty Award programme of the Natural Sciences and Engineering Research Council (NSERC). The department has interests in a range of Atmospheric Science and Geophysical research areas; candidates in either Atmospheric Science or Earth Science (including Geology) are encouraged to apply. These NSERC awards are tenable at Canadian Universities for a period of 5 years during which time it is expected that successful applicants would be able to obtain a regular faculty appointment. The deadline for applications, which must include a current CV, three confidential letters of reference and a research proposal appropriate for an NSERC operating grant to be considered by this department, is July 30th, 1991, in order to give adequate time for the preparation of material for NSERC.

The NSERC deadline for nominations is Oct. 15th 1991 for awards to be taken up between April 1 and July 1, 1992. Further details may be obtained from Prof. P.A. Taylor, Dept. of Earth and Atmospheric Science, York University, 4700 Keele St., North York, Ontario, Canada M3J 1P3. Phone (416)-736-5245, FAX (416)-736-5817. In accordance with Canadian immigration requirements and the regulations governing these awards, this advertisement is directed at Canadian citizens, landed immigrants and permanent residents.

Volume 29 No 2 June 1991 Juin

ATMOSPHERE-OCEAN

Contents/Table des matières

R. W. Stewart Symposium Issue

Bermuda Shadow. Walter Munk

Evidence for decadal variability in an ocean general circulation model: An advective mechanism. Andrew Weaver and E.S. Sarachik

Application of a coupled ice-ocean model to the Labrador Sea. Lawrence Mysak, Shiling Peng and Rosemary Wood

A generalized reduced-gravity ocean model. Hernan G. Arango and Robert O. Reid

Deep and intermediate water replacement in the Strait of Georgia. Paul H. LeBlond, Helai Ma, Ford Doherty & Stephen Pond

Marginal mixing theories. Christopher Garrett

Observations of the "Salt Fountain". Thomas Osborn

Radar measurement of rainfall by differential propagation phase: A pilot experiment. M. English, B. Kochtubajda, F.D. Barlow, A.R. Holt and R. McGuinness.

Volume 29 No 3 September 1991 Septembre

ATMOSPHERE-OCEAN

Contents/Table des matières

Sensitivity experiments for polar low forecasting with the CMC mesoscale finite element model. Michel Roch, Robert Benoit and Neil Parker.

Regional-scale surface hydrological simulations from global climate models: A case study. Graham Thomas, A. Henderson-Sellers and A.J. Pitman.

An alternative approach to the extreme value analysis of rainfall rates. Francis W. Zwiers & Wm. H. Ross.

Graupel growth and trajectories in a shallow C_b cloud determined by a forced 1-D model. Mladjan Curic and Dejan Jang.

The King City operational Doppler radar: Development, all-season applications and forecasting. C.L. Crozier, P.I. Joe, J.W. Scott, H.N. Herscovitch and T.R. Nichols.

Skew eddy fluxes as signatures of non-linear tidal interactions with application to Georges Bank. John W. Loder and Edward P. Horne.

Frontal oscillations on the NE Newfoundland Shelf. S. Narayanan, E.B. Colbourne and C. Fitzpatrick.

Deep water stratification of ocean general circulation models. Patrick Cummins.

Estimation of the Pacific Ocean meridional heat flux. G.A. McBean.

Nonlinear response of current meter compasses. David A. Booth and Colin Griffiths.

Volume 29 No 4 September 1991 Septembre

ATMOSPHERE-OCEAN

as of 29 May/en date de 29 Mai 1991

Initialization and diagnostic application of operational analyses. Steve Lambert.

An example of attenuation by wet snow on a radar dome. Norman Donaldson

A comparison of different methods of estimating energy-limited evapotranspiration in the Peace River region of British Columbia. Karim Abbaspour.

Wind-driven depth-averaged circulation in Queen Charlotte Sound and Hecate Strait. Charles G. Hannah, Paul H. LeBlond, William R. Crawford and W. Paul Budgell.

Volume 25 No 1 April 1991 Avril

Climatological Bulletin

Bulletin climatologique

Contents/Table des matières

Articles:

The frequency and surface characteristics of sea breezes at St. John's, Newfoundland. Colin E. Banfield.

Break-up in Hudson Bay: Its sensitivity to air temperatures and implications for climate warming. D.A. Atkin.

Notes:

Estimation des flux de chaleurs latente et sensible à partir de l'énergie radiante pour certaines surfaces: Nouveau-Québec. Gérald Renaud et Bhawan Singh.

Climatology of tornado days 1960-1989 for Manitoba and Saskatchewan. R.L. Raddatz and J.M. Hanesiak.

News and comments/Nouvelles et commentaires

Volume 25 No 2 August 1991 Août

Climatological Bulletin

Bulletin climatologique

As of 1st June/en date de 1 Juin 1991

An assessment of the 27 year record of measured precipitation at Ocean Weather Station P in the Northeast Pacific Ocean. J.L. Knox.

Greenland Sea ice and salinity anomalies and interdecadal climate variability. L.A. Mysak and S.B. Power.

Étude du phénomène de vents violents au Québec en tant que catastrophe naturelle. J. Lacroix et D. J. Boivin.

Estimating the sensitivity of soil moisture reserves to changes in precipitation amount and frequency. J.A. Dyer.

1961-90 natural mean daily temperatures: Both warmer and cooler months on the eastern Canadian prairies. R.L. Raddatz, J. Maybank and G.B. Atkinson.

CONFERENCES / CONFÉRENCES

Canadian Meteorological and Oceanographic Society

CALL FOR PAPERS

Fourth Workshop on Operational Meteorology
September 15th-18th, 1992
Whistler, B.C., Canada

The Fourth Workshop on Operational Meteorology, sponsored by the Atmospheric Environment Service of Environment Canada and the Canadian Meteorological and Oceanographic Society, will be held September 15th-18th, 1992 at the Whistler Conference Centre. The principal theme of this workshop will be "Forecasting in the Nineties".

The Program Committee wishes to solicit papers on the following topics:-

- 1) The meteorological data explosion - the integration and effective use of information in an operational setting.
- 2) Forecasting techniques and conceptual models - their place in forecast decision making.
- 3) Climate services - how can they be used effectively?
- 4) Delivery - techniques and requirements to deliver forecasts effectively to the user.

The workshop format will consist of laboratory sessions, submitted papers, invited papers, panel discussions, poster sessions and demonstrations. A brief introduction of each poster session will be made during an appropriate oral session.

Titles and abstracts of 400 to 800 words should be sent to Neil McLennan, Chairman Program Committee, Atmospheric Environment Service, Suite 200, 1200 West 73rd Avenue, Vancouver B.C. V6P 6H9, Canada. Authors should indicate their preference for presenting their paper orally, in a laboratory or poster session, or as a demonstration. Preferences will be considered to the greatest extent possible. Abstracts will be evaluated on their relevance to the theme as well as on quality. Papers not related to operational meteorology will not be accepted. The deadline for laboratory submissions is October 1st, 1991 and for all others is February 1st, 1992.

Authors will be notified regarding the acceptance of their abstracts and instructions on the format of their papers by November 1st, 1991 for laboratories and by March 1st, 1992 for other sessions.

Complete camera-ready papers of not more than 8 pages, including diagrams, must be received by the Program Chairman no later than June 15th, 1992. A pre-print volume will be prepared and distributed to all registered workshop attendees.

For additional information contact either Neil McLennan (Tel. (604)-664-9073, FAX (604)-664-9066) or Gérard Neault (Tel. (604)-664-9052)

La Société Canadienne de Météorologie et d'Océanographie

APPEL DE PRÉSENTATIONS

Quatrième atelier de travail sur la météorologie opérationnelle
15-18 septembre, 1992
Whistler, C.B., Canada

Le quatrième atelier de travail sur la météorologie opérationnelle, parrainé par le Service de l'environnement atmosphérique d'environnement Canada et la Société Canadienne de Météorologie et d'Océanographie, aura lieu du 15 au 18 septembre, 1992, au Centre de Conférence de Whistler. Le thème de l'atelier sera "La prévision du temps durant les années 90".

Le comité responsable du programme est à la recherche d'articles sur les sujets suivants:

- 1) L'explosion des données météorologiques - l'intégration et l'utilisation efficace de l'information en milieu opérationnel.
- 2) Les techniques de prévision et les modèles conceptuels-leurs place dans la processus de décision des prévisions.
- 3) Les services climatologiques-comment peut on les utiliser efficacement.
- 4) La distribution - les techniques et les conditions pour distribuer efficacement les prévisions à l'utilisateur.

L'atelier sera sous forme de laboratoires, de présentations par des conférenciers invités, des sessions de table-ronde, des sessions d'affichage et des démonstrations. Chaque présentation des sessions d'affichage sera annoncée brièvement par session orale appropriée.

Un résumé (incluant le titre) d'une longueur de 400 à 800 mots devra être envoyé à Neil McLennan, président du comité de programme, Service de l'environnement atmosphérique, suite 200, 1200 West 73rd Avenue, Vancouver, C.B., Canada, V6P 6H9. Les auteurs devront indiquer leurs préférences pour faire leurs présentations lors qu'une session orale, d'une session d'affichage, d'un laboratoire, ou d'une session de démonstration. Les préférences seront respectées dans la mesure du possible. Les résumés seront évalués selon leur rapport avec le thème et leur qualité. Les articles non reliés à la météorologie opérationnelle ne seront pas acceptés. Les résumés pour les laboratoires doivent être reçus le 1^{er} octobre 1991. Pour les autres types de présentations les résumés doivent être reçus le 1^{er} février 1992.

Les autres seront avisés le 1^{er} novembre 1991 pour les laboratoires et le 1^{er} mars 1992 pour les autres sessions de l'acceptation de leurs articles et des instructions sur le format exigé leur seront fournis.

Les articles prêts à être photographiés ne devront pas excéder 8 pages incluant les diagrammes et devront être reçus par le président du comité de programme au plus tard le 15 juin 1992. Un programme des présentations sera préparé et distribué aux participants.

Pour des renseignements supplémentaires veuillez contacter Neil McLennan (Tel. (604)-664-9073, FAX (604)-664-9066) ou Gérard Neault (Tel. (604)-664-9052).

World Meteorological Organization
Atmospheric Environment Service
Institute for Space and Terrestrial Science
Canadian Meteorological and Oceanography Society

The 2nd WMO Operational Ice Remote Sensing Workshop will be held September 10-13, 1991, in Ottawa, Ontario. Theme: operational applications of remotely-sensed ice information to ice forecasting. For information, see last Newsletter.

Alfred Wegener Foundation for the Promotion of the Geosciences

The International Trade Fair and Congress for Geosciences and Technology will be held September 18-21, 1991, in Cologne, Germany. The theme will be "Preserving the Earth - a Challenge to Science and Technology."

Session topics will be: The Geobiosphere in the Process of Change - condition of the earth's ecosystem and its development in the past and in the future; Data registration and Exploration of the Earth's System - data processing and methods of recording, measuring, depicting and illustrating information; Exploitation of the Geobiosphere - strain on Earth, water and air, with perspectives on utilization of natural resources; and Adaptation of the Results for Environmental Protection - objectives and strategies, measures and standards to preserve the geobiosphere.

For information, please contact Mr. U. Schneider, Cologne Congress Management, Postfach 180 180, 5000 Köln 1, Germany (Tel: 221 236413; Fax: 221 249447).

Joint United States/Canada Symposium

A Symposium on the Implications of Climate Change for Pacific Northwest Forest Management will be held October 23-25, 1991, in Seattle, Washington. Focusing on the Pacific Northwest, it will define issues/sensitivity of the forest sector to climate change, and identify potential management responses. Contact: Dr. Richard Silversides, Pacific Forestry Centre, 506 West Burnside Road, Victoria, B.C., V6Z 1M5 (Tel: (604) 363-0727).

Air and Waste Management Association - Ontario Section

September 22-24, 1991

Annual Fall Meeting

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Focus on Municipal and Industrial Experiences"

Contact: Stephen Toplak

(416)-735-0035

European Geophysical Society

The XVII General Assembly will be held April 6-10, 1992, in Edinburgh, Scotland. The deadline for receipt of abstracts for the 1992 General Assembly is January 15, 1992. The meetings are open to all scientists. For information, please contact the EGS Office, Postfach 49, 3411 Katlenburg-Lindau, Germany (Tel: (49) 5556-1440; Fax: (49) 5556-4709).

5th International Meeting on Statistical Climatology

The 5th International Meeting on Statistical Climatology (5IMSC) will be held June 1992 in Toronto, Canada. The 5IMSC program is the responsibility of a Program Committee which of climatologists and statisticians and is chaired by Dr. Francis Zwiers (Canadian Climate Centre). The IMSC series of meetings is sustained by a free-standing Steering Committee of statistical climatologists chaired by Prof. Allan Murphy of Oregon State University. This meeting will be collocated with the 12th Conference on Probability and Statistics in Atmospheric Sciences (12PSAS) and sessions concerning topics of mutual interest will be organized jointly by the two groups. The joint theme is the detection of the enhanced greenhouse gas effect.

Papers are solicited on all aspects of statistical climatology and statistical methodology pertaining to climatology. Special emphasis will be placed on: a) papers which deal with methodology for describing, estimating and making inferences about climate change; and b) papers which describe observed and/or simulated climate change, trends in climate indices, developments pertaining to base line datasets, and other topics related to the observation and detection of anthropogenic and natural climate change. The acceptance of papers will be based on a 400-600 word reviewer's abstract. Authors or groups desiring to present more than one paper are urged to assign a priority to the abstracts submitted in case the volume of papers forces the Program Committee to limit the number of presentations. Both oral and poster sessions are anticipated. Authors should indicate their preference when submitting abstracts. Every effort will be made to assign papers to sessions according to requested mode of presentation. Overhead and 35 mm slide projectors will be available at the meeting for oral presentations. Arrangements can be made for authors wishing to use other presentation equipment (i.e., projection television) if they bring their own equipment or agree to pay the rental fees. Titles and reviewer's abstracts should be received by the Program Chairman no later than 20 December 1991. Authors will be notified in February 1992 regarding acceptance of their papers. A modest amount of support will be available for participants from developing countries who require assistance with travel and local expenses. Requests for support should be included with the reviewer's abstracts. Instructions for the preparation of camera ready manuscripts will be furnished to the authors of accepted papers. Complete manuscripts of not more than eight pages in length (letter or A4 size), including diagrams and photographs, must be received by the Program Chairman no later than 15 April 1992. Attendees will receive a

preprint volume at the time of registration.

Program Chairman

Dr. Francis W. Zwiers, Numerical Modelling Division, Canadian Climate Centre, 4905 Dufferin St., Downsview, Ontario, CANADA M3H 5T4 (Tel: (416) 739-4415; Fax: (416) 739-4521; E-mail: acrnrfz@cid.aes.doe.ca).

American Meteorological Society

The 12th Conference on Probability in the Atmospheric Sciences (12PSAS) will be held June 22-26, 1992, in Toronto, Canada. It will emphasize climate change and, particularly, the detection of the enhanced greenhouse-gas effect. Information: Prof. Paul Mielke, Department of Statistics, Colorado State University, Fort Collins, CO 80523, U.S.A. (Tel: (303) 491-6465; Fax: (303) 491-7895).

Atmospheric Environment Service of Canada
Université du Québec à Montréal
McGill University

The 11th International Conference on Clouds and Precipitation, organized by the International Commission on Clouds and Precipitation (ICCP) of the International Association of Meteorology and Atmospheric Physics, will be held on the campus of McGill University in Montreal, Canada, on August 17-21, 1992.

The ICCP has recently broadened its mandate to include all aspects of clouds and precipitation. Accordingly, papers are invited in the following technical areas: cloud microphysics, precipitation physics, instrumentation, the remote sensing of clouds and precipitation (including satellite observations), the mesoscale structure of precipitation systems, radiative effects of clouds, cloud and precipitation chemistry, the effects of clouds on global climate and air quality, and clouds and precipitation in relation to the hydrological cycle.

Single-page abstracts, including author's address and telephone number, should be sent to Professor Peter V. Hobbs, Atmospheric Sciences AK-40, University of Washington, Seattle, WA 98195, USA. Indicate whether the paper is submitted for oral presentation or for a poster session. **The abstract deadline is November 1, 1991.** To be considered for the conference, abstracts must reach Professor Hobbs by no later than this date. Authors will receive notifications of acceptance by January 31, 1992. The deadline for completed manuscripts to be included in the conference proceedings will be April 30, 1992.

For further information about the conference, please contact 11th ICCP, Conference Office, McGill University, 3450 University Street, Montreal, Canada H3A 2A7 (Tel: (514) 398-3770; Fax (514) 398-4854). Questions about the scientific program should be directed to Professor Peter V. Hobbs, Atmospheric Sciences AK-40, University of Washington, Seattle, WA 98195, USA (Tel: (206) 543-6027; Fax (206) 543-0308).



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Entries on the following pages are restricted to CMOS Accredited Consultants. The accreditation process started in December, 1986. A complete list of CMOS accredited consultants can be obtained from the CMOS Business Office. Individuals interested in applying for accreditation may contact the CMOS Business Office at the Society's Newmarket address for a copy of the guidelines, and an application form.

As set out in the document, "CMOS Guidelines for Accreditation", the criteria are:

- (1) The applicant must possess an appropriate undergraduate degree from a recognized university.
- (2) The applicant must possess at least one of the following types of specialised training:
 - (i) post-graduate degree from a recognised university in meteorology or oceanography.
 - (ii) post-graduate degree from a recognised university in the natural or applied sciences or mathematics specializing in one or more branches of meteorology or oceanography; or
 - (iii) three years of on-the-job meteorological or oceanographic experience.
- 3) Upon completion of the above educational and training requirements, the applicant must have spent at least two years of satisfactory performance at the working level in the field of specialisation included in this document. This should include at least some consulting experience.

Les entrées sur les pages suivantes sont réservées aux experts-conseil accrédités de la SCMO. Le processus d'accréditation a débuté en décembre 1986. Une liste complète des experts-conseil accrédités de la SCMO peut être obtenue du bureau d'affaires. Les personnes désirant l'accréditation doivent entrer en contact avec la Société à Newmarket afin de recevoir une copie de règlements et un formulaire d'application.

Le document "Règlements de la SCMO pour l'accréditation" liste les critères suivants:

- (1) L'applicant doit posséder un degré universitaire de premier cycle approprié d'une institution reconnue.
- (2) L'applicant doit posséder au moins un des types suivants de formation spécialisée.
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 - (iii) trois années d'expérience de travail en météorologie ou en océanographie.
- (3) Une fois les exigences d'éducation et formation complétées, l'applicant doit avoir au moins deux années de travail, avec performance satisfaisante, dans un champ de spécialisation mentionné dans ce document. Une certaine expérience d'expert-conseil est nécessaire.

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February/Février 1991 Vol 19 No. 1

See over/au verso

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