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

Canadian Meteorological and Oceanographic Society

La Société canadienne de météorologie et d'océanographie

APRIL/AVRIL 1991 VOL. 19 NO. 2

## NEWS FROM HEADQUARTERS

CMOS Council met in February to discuss preparations for the 25th Annual General Meeting and Congress. It approved the nominations for the 1991/1992 Council, the CMOS awards and Life Memberships, and appointments of new members for various Committees. It agreed that the 4th AES/CMOS Operational Meteorology Workshop should take place in September 1992 in British Columbia; Whistler is a possible location. Approval was also given to CMOS co-sponsorship of, and active participation in, the 5th International Meeting on Statistical Climatology to take place in Toronto, June 1992. An ongoing activity is the Council study of the recommendations of the Committee on the future of Climatological Bulletin. Council members who have not yet commented on the report of the Committee are urged to do so as soon as possible so that the Council can finalize its recommendations for the Annual General Meeting.

The National Executive which met in March was sorry to have to accept the resignation for personal reasons of our Treasurer, Bruno de Lorenzis. He has devoted much work to computerizing the increasingly complex financial affairs of the Society. The Executive thanked Bruno and in a subsequent Special Council Meeting appointed Eli Goldberg as interim Treasurer until the 1991 AGM.

The Executive was pleased to receive a number of positive comments on the improvements in the contents of the CMOS Newsletter. As it is intended to continue to include and even increase technical contents (for example Book Reviews, material from SIGs, etc.), members are invited to provide suitable material and suggestions to the Editor. I hope to meet as many as possible of you at our Winnipeg Congress. It will be our 25th and should be a memorable one. There will among other things be a special CMOS 25 years Congress Luncheon where Morley Thomas, our well known Archivist will talk about CMOS history.

The Executive Director

## NOUVELLES DU QUARTIER GÉNÉRAL

Le Conseil de la SCMO s'est réuni en février pour discuter de préparatifs pour la 25ième réunion générale annuelle et du Congrès. Il a approuvé les nominations pour le Conseil de 1991/92, les récompenses SCMO et les membres à vie, et les nominations des nouveaux membres pour les différents comités. Il fut convenu que le 4ième Atelier sur la météorologie opérationnelle SEA/SCMO se tiendra en septembre 1992 en Colombie Britannique, probablement à Whistler. Il fut également approuvé de co-parrainer et de participer activement à la préparation de la cinquième Réunion internationale sur la Statistique Climatologique qui se tiendra à Toronto, juin 1992. Présentement, le Conseil étudie les recommandations du Comité sur l'avenir du Bulletin Climatologique. Les membres du Conseil qui n'ont pas encore donné leurs avis sur le rapport du Comité sont priés de la faire le plus tôt possible pour que le Conseil puisse finaliser ses recommendations pour la réunion Générale annuelle.

Lors de sa réunion de mars, l'Exécutif national a dû accepter avec regret la résignation, pour des motifs personnels, de son trésorier, Bruno de Lorenzis. Bruno a accompli beaucoup de travail pour informatiser les finances de plus en plus complexes de la SCMO. L'Exécutif remercie Bruno et, à une réunion spéciale ultérieure, le Conseil a nommé Eli Goldberg trésorier par intérim jusqu'à la réunion générale annuelle de 1991.

L'Exécutif a reçu avec satisfaction plusieurs commentaires positifs sur les améliorations du Bulletin de Nouvelles. Etant donné que le but est de continuer dans cette direction et même d'en augmenter le contenu technique (avec par exemple le revues de livres, les nouvelles des groupes spécialisés, etc), les membres sont invités à soumettre des articles appropriés et des suggestions à l'éditeur. J'espére rencontrer plusieurs d'entre vous au Congrès de Winnipeg. Ce sera le 25ième Congrès et il devrait être mémorable. Il y aura en autre un dîner spécial pour fêter le 25ième Congrès durant lequel Morley Thomas, notre archiviste bien connu, nous fera un tableau de l'histoire de la SCMO.

Votre directeur exécutif.

## LABRADOR SEA

The Dalhousie group is focusing on simple models of global climate, on the response of the Labrador Sea to wind stress variations over the North Atlantic, and on deep convective processes in the Labrador Sea. Details on each of these projects are given below by Dan Kelley, Keith Thompson, Dave Brickman, Dalhousie University and Dan Wright, Bedford Institute of Oceanography, Halifax, N.S

### Climate Models
by Dan Wright

Dan Wright and Thomas Stocker (McGill University) are collaborating on a project aimed at developing a computationally efficient model of the thermohaline circulation of the global ocean (Wright and Stocker, 1991, JPO, in press). The approach hinges on a simple relation between the zonally averaged east-west and north-south pressure gradients: the relation involves one arbitrary constant which has been estimated using results from the Bryan-Cox OGCM (kindly made available by Andrew Weaver). Results of the simplified model have been shown to compare favourably with observations and with results of more complex OGCMs over a wide range of conditions (Stocker and Wright, 1991, JPO, in press).

The model has recently been generalized to allow multiple basins connected via the Southern Ocean, and the influence of wind stress. Wright and Stocker are presently undertaking a detailed parameter sensitivity study of the basic ocean model, as well as studying an extension which includes an energy balance climate model. Eventually, they hope to include a simple cryosphere and biosphere.

Many questions can be examined using such a model. One use will be to study the influence of different convection schemes on the global thermohaline circulation. This aspect of the study will be undertaken in collaboration with investigators at Dalhousie University (Dan Kelley and Dave Brickman), who are using laboratory and theoretical models to develop improved parameterizations for sub-gridscale convective mixing. These parameterizations will be incorporated in this simple ocean model to see if they significantly affect the global ocean circulation.

### Wind-forced Circulation
by Keith R. Thompson and Dan Wright

According to the flat-bottomed Sverdrup relationship, approximately 50 x $10^6$ $m^3/s$ {-1} flows westward past the southern tip of Greenland and into the Labrador Sea. Only a small fraction of this transport, approximately 10%, flows southward along the shelf break, offshore of Labrador. From diagnostic calculations (Provost and Salmon, 1986, JMR, 44:1-34) and the comparison of topographic Sverdrup transports with coastal sea level (Thompson, Lazier and Taylor, 1986, JGR, 91:14261-14268), it appears that the remaining 90% of the southward return flow is in deeper water - part of a large cyclonic gyre within the Labrador Sea.

In July 1987, a line of current meter moorings with bottom pressure gauges was deployed from Hamilton Bank to the centre of the Labrador Sea. Initial processing of these data has now been completed. Along with six-hourly ECMWF wind stress fields for the whole North Atlantic, these data will be used to map out the mean and seasonal circulation in the Labrador Sea and also test some simple time-dependent models of how the Labrador Sea responds to changes in the North Atlantic wind field on time scales of days to months.

### Hydrography and Deep Convection in the Labrador Sea
by Dan Kelley

With an aim of better understanding the "Great Salinity Anomaly" of the 1970s, and as a background for investigations of deep convection in the Labrador Sea, an analysis is underway of the decade-long hydrographic measurements at Ocean Weather Ship Bravo. This site, at the entrance to the Labrador Sea, is seasonally flooded by a surface layer of relatively fresh water. In addition to this seasonal signal, there is considerable inter-annual variability, which is of great interest because it might affect wintertime deep convection.

Lazier (1980, Atmosphere-Ocean, 18:227-238) noted a strong freshening at Bravo in the early 1970s. The source of the fresh water is uncertain; Dickson et al. (1988, Prog. Oceanogr., 20:103-151) regard this freshening as the arrival in the Labrador Sea of the "Great Salinity Anomaly", a pulse of relatively fresh water which propagated cyclonically around the North Atlantic from the late 1960s to the early 1980s. According to Dickson et al., the freshening stood out from an 80-year hydrographic record, and was linked to an anomalous atmospheric pressure maximum over Greenland in the 1960s, and to unusually harsh winter conditions in Europe at that time.

A central question in this scenario is where the fresh water came from. Analysis of the OWS Bravo theta-S diagrams suggests that the fresh water source was sea ice melted by contact with warm sea water. This possibility can be separated from others, such as precipitation or the melting of ice by solar insolation, by a characteristic signature on the theta-S diagram (Moore and Wallace, 1988, JGR, 93:565-571). The strong signature in the theta-S data suggests that the fresh water might have been formed when anomalous wind patterns swept sea ice over warm water. This appears to coincide with an anomalous atmospheric high pressure cell over Greenland identified by Dickson et al. (1988) as part of the dynamics of the Great Salinity Anomaly.

Further work will include looking for a link between the Bravo

salinity variations and Arctic sea ice extent, and looking for this theta-S signal in other locations in the Northwest Atlantic through the decade in question and beyond. This freshening event is important because understanding its effect on deep convection in the Labrador Sea, and its relationship to atmospheric variations over decadal timescales, may lead to better understanding of the climate signal, and help us to place limits on predictions of future changes.

Models of Deep Convection
by Dave Brickman and Dan Kelley

Although deep convection is thought to be a regular wintertime phenomenon in particular regions of the ocean, the process itself has rarely been observed. The most successful observations have been in the MEDOC region of the Mediterranean and the Labrador Sea (Gascard, 1978, Ocean. Acta, 1:315-330; Clarke and Gascard, 1983, JPO, 13:1764-1797). In all cases a complicated flow field was observed, involving motions on scales from 5 to 50 km. How the various scales develop and interact and how they are affected by rotation are important questions relating to interpretation of observations and our ability to parameterize the downward mixing and spreading associated with the ocean's convecting regions.

Brickman and Kelley are working on a series of laboratory rotating table experiments to study convection from isolated sources in homogeneous and stratified fluids. The heat sources (wire grids) range in size from much smaller than the radius of the tank (although not small compared with the Rossby Radius), to the size of the tank itself. The questions under immediate investigation are:

(1) Does the fluid in the far field adjust according to Gill's (1982, Atmosphere-Ocean Dynamics, Acad. Press) simple theory of flow forced by a line source of buoyancy?
(2) What is the effect of rotation on this form of forced convection? Does rotation inhibit convective as in two-sided rotating convection experiments, and does Kelley's (1987, JMR, 45:829-841) theory of that case apply here as well?
(3) What is the stability of the convectively forced region?
(4) What scales emerge, how do they evolve through time, and how do they change as the size of the buoyancy source approaches the size of the tank?
(5) What are the important non-dimensional parameters, and where does the ocean fit in the parameter space?

The experiments, although early in their development, have already shed light on some of the above questions. For example, it seems that the effect of rotation is very pronounced in its ability to restrict the inward motion of fluid particles from outside the convecting region, and that the chimney-like convective structure produced is unconditionally unstable. A summary of these experimental results will be prepared for the upcoming 1991 CMOS conference in Winnipeg.

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NORTH ATLANTIC TRACER RELEASE EXPERIMENT (NATRE)

Turbulence and Microstructure Measurements of Vertical Mixing in the North Atlantic Tracer Release Experiment: a WOCE Core-Project 3 Experiment
by Barry Ruddick, Dalhousie University
and Neil Oakey, Bedford Institute of Oceanography, Halifax, N.S.

Most of the poleward heat transport in the ocean occurs via slow meridional overturning known as thermohaline circulation. As its name suggests, this is driven by the heating and cooling at the ocean surface, and is strongly affected by the patterns of evaporation and precipitation. The strength, and even the nature of this circulation depend on the near vertical mixing of heat, salt, and momentum. However, we know little about the rate of mixing, the mechanisms causing it, or how this mixing might vary as a result of global climate change.

In the spring of 1992, a thin, isopycnal layer of water will be seeded with sulfur hexafluoride, a manmade inert tracer detectable at extremely low concentrations. The patch will be followed with SOFAR floats for about a year, and its observed rate of spread across isopycnals will give direct measurement of the vertical diffusivity of the tracer. This, the North Atlantic Tracer Release Experiment (NATRE), is part of WOCE Core 3, and will take place in the main thermocline of the Eastern subtropical North Atlantic.

Using the profiler EPSONDE, we will concurrently measure the microscale temperature variance and velocity shears, as well as the finescale temperature and salinity structure and current shear. With these measurements, we will obtain independent estimates of vertical mixing rate. The comparison with the directly measured tracer diffusivity will provide the first direct, in-situ calibration of the measurements, methods, and turbulence models used to infer mixing rate. These comparisons will test and validate our mixing models, and tell us which of several possible mixing processes is dominant in that area and depth.

In addition to improved scientific understanding of the processes which modify water masses in the main thermocline, this direct comparison will lead to savings in cost in the long term. Tracer experiments are too expensive to repeat in many locations (besides, the tracer could build up to high enough levels to contaminate later experiments). Measurements of microstructure plus models which relate these measurements to mixing rates will be used to fill in the huge spatial and temporal gaps between tracer experiments, and so help to build up a complete picture of where and how quickly the ocean is mixing and knowledge of how

it might change as a result of changes in oceanic and atmospheric changes. This picture will form an integral part of large-scale global circulation models which will be used for understanding and prediction of climate.

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North Atlantic Sea Level Variations

by Brad de Young, Memorial University, St. John's, Nfld., jointly with Richard Greatbatch

I have obtained hourly sea level data from 16 stations around the North Atlantic. These data cover a four-year period, long enough to investigate the energy band of interest, periods up to 30 days. A great deal of effort was applied to clean up the data, to remove the tidal signal and to filter out high-frequency 'noise' at periods below a day. That has all been done and now we are starting to look at the data. The time series show a number of interesting features:

(1) strong coherence at low frequencies on the western and eastern side of the Atlantic;
(2) so far not much coherence across the Atlantic;
(3) some clear structure in the signal below and above the mid-Atlantic bight (similar to the results of Thompson (1990) at lower frequencies); and
(4) much more high frequency (5-10 day) energy on the western side of the basin, possibly related to the Gulf Stream.

Analysis of these data is ongoing. Once the data analysis is complete, we will decide how we will model the data, if that approach looks promising.

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WOCE MODELLING ON THE WEST COAST

The following reports have been received from large-scale modellers at the University of British Columbia and the Institute of Ocean Sciences regarding work funded by or of interest to WOCE.

Canadian WOCE Modelling Efforts at UBC

by William Hsieh

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

We are setting up a global ocean model which can be coupled in the future to the Atmospheric General Circulation Model (AGCM) at the Canadian Climate Centre (CCC). Presently, the CCC AGCM needs an ocean model capable of simulating the thermohaline circulation, which is very important for climate change studies, including the doubled carbon dioxide problem. The global ocean model is based on the GFDL (Geophysical Fluid Dynamics Laboratory) MOM (Modular Ocean Model), which is the latest version of a primitive-equation model originated from Bryan and Cox. Warren Lee is setting up a 15-level ocean with a horizontal grid following the T32 grid used in the CCC AGCM (96 X 48 horizontal grid points). The ocean model is forced by the surface wind stress and by relaxing to the observed sea surface temperature and salinity data, with the seasonal cycle included in the forcing.

Another research area is the assimilation of sea surface temperature (SST) data into primitive-equation ocean models. Dr. Julie Pietrzak has started examining a new scheme for assimilating SST data into an eddy model. A previous attempt by A.T. Weaver (1990) to assimilate SST led to the identification of two problems - difficulty in injecting warm SST information down the water column, and the gradual cooling of the model - which will hopefully be overcome by this new scheme.

Numerical Models of the Pacific

by Josef Cherniawsky, Institute of Ocean Sciences, Sidney, B.C.

An upper ocean model, containing a mixed layer and a pycnocline layer over a semi-passive deep ocean, was used to simulate a climatological seasonal cycle in the North Pacific. Model resolution is 1 deg. latitude by 1.5 deg. longitude and it was driven with climatological monthly wind stress and heat and fresh-water fluxes. Sensitivity to several aspects of parameterization were investigated and described by Cherniawsky and Holloway (submitted to Atmosphere-Ocean). A more recent version of this model also includes thermodynamic sea ice with horizontal advection parameterized as in Thorndike and Colony (1982).

More recently, two initiatives were undertaken at the Institute of Ocean Sciences using full-depth ocean climate models: (1) The GFDL Bryan and Cox model contains an option for a wind-driven mixing layer. The differences between this model output with and without this option are investigated with a view to also include buoyancy mixing in the GFDL Modular Ocean Model; and (2) Preliminary experiments also begun with the ocean climate model of Oberhuber (1990), configured in a coarse-resolution (4X4 deg., 5 layers) Pacific Ocean domain. This model vertical coordinates are in terms of isopycnal layers, thus departing significantly from the more traditional horizontal levels approach and is possibly more suitable for simulating mass and property transports.

Representing Eddy-topography Interaction for WOCE Modelling

by Greg Holloway, Institute of Ocean Sciences, Sidney, B.C.

One of the most daunting challenges for the WOCE modelling program arises from the role of ocean eddies. To resolve these energetic motions, with length scales 10 to 100 km, while seeking to perform global ocean integrations over time scales of decades to centuries poses an enormous computational burden - by supercomputing standards of today and even of tomorrow. On the other hand, not to resolve the eddies but rather to relegate them to some manner of "eddy viscosity" is haphazard at best and demonstrably wrong in many cases. This dilemma motivates WOCE research at trying to better understand the aggregate effect of eddies so the influence of eddies can be realized by ocean

models without the cost of high resolution.

Considered theoretically from the view of the ocean as a system of very many interacting degrees of freedom, some insight into the "eddy problem" may be gained from methods of statistical mechanics. The hypothesis is that eddy interactions should tend, on average, to increase an overall system entropy. A particular application has been to eddy-topography interaction. Even subtle motions, as small as 1 cm/sec, if correlated with topographic variations as small as 100 m height (in 5 km depth), can be shown to exert effective forces on the ocean that may be as large as typical wind stress. Yet, such weak motions and minor topographic "roughness" are usually neglected for global ocean modelling. Or the topographic effect might be parameterized in terms of a bottom drag. Theory shows however that the topographic effect is not a drag at all, but rather will force mean ocean circulations. Global maps of the theoretical circulation due to eddy-topography entropy maximization have been easily produced. Current research at the Institute of Ocean Sciences is directed toward a hybrid model, joining these theoretical results with numerical modelling of a more usual sort.

Deep Water Stratification of Ocean General Circulation Models

by Patrick F. Cummins
Institute of Ocean Sciences, Sidney, B.C.

A central problem in climate and ocean modelling is the accurate simulation of the climatological state of the oceanic density field. A constant vertical diffusivity for heat and salt is frequently employed in ocean general circulation models (OGCMs) and it is usually assigned a value designed to optimize the depth of the pycnocline. One undesired consequence of this choice is a poor representation of the deep water, which is usually insufficiently stratified. In contrast to the uniform diffusivity of many models, some observational studies suggest that the vertical diffusivity is not constant but increases with depth, possibly in inverse proportion to the local buoyancy frequency. Numerical experiments with an OGCM are presented which demonstrate that allowing the vertical diffusivity to increase below the pycnocline substantially increases the stratification of the abyssal water mass of these models without significantly affecting the pycnocline depth, and hence may lead to a better representation of the vertical density structure. The results are interpreted with a simple vertical advection-diffusion model.

A Global Coordinate Rotation Utility

by Michael Eby, Institute of Ocean Sciences, Sidney, B.C.

A limitation in using the GFDL Modular Ocean Model (MOM) for world ocean circulation studies arises from the use of spherical coordinates in the finite difference scheme. Convergence of lines of longitude at high latitudes aggravates instabilities such as noted by Killworth in relation to steep topographic gradients. A utility (World Axis Rotation Program - WARP) has been devised to provide an arbitrary rotation of the spherical grid to optimize model performance in any limited region such as a marginal sea. Tilting the WARP grid one can maximize efficiency by reducing the number of land points and provide more flexibility in defining boundary conditions. Penalties are that data must be interpolated onto a transformed grid, and the Coriolis parameter varies with longitude as well as latitude.

The Arctic is a region of particular interest for the application of a WARPed MOM. Although the Arctic is not officially a "WOCE ocean", the intent is to supply WOCE global modelling with interactive boundary conditions along an open North Atlantic sector.

Modelling of Thermohaline Structure

by Charles Lin, McGill University, Montreal, P.Q.

A 3-dimensional planetary geostrophic ocean general circulation model has been formulated to examine the thermocline structure and thermohaline circulation in an idealized ocean basin. This study has as co-investigators R. Greatbatch of Memorial University, and doctoral student S. Zhang of McGill. The model equations consist of the full prognostic temperature and salinity equations, and diagnostic momentum equations in spherical coordinates. An extensive parameter sensitivity study is conducted with the model, and a comparison is made with the results obtained by the Cox/Bryan primitive equation model.

For the steady state response, the planetary geostrophic model is able to reproduce the results of the primitive equation model with much lower computational costs. As horizontal viscosity is not needed for numerical stability in the model, it can simulate a stronger thermohaline circulation. The role of convection in forcing the latter is carefully examined. A comparison of the results with 2-dimensional latitude/depth models is made. The model can also be used to deal with transient problems of interest in climate studies.

## NEW CMOS MEMBERS

These new members were approved March 22, 1991:

| | |
|---|---|
| Mr. Yahui Zhuang (student) | Alberta |
| Mr. Ray Garnett (regular) | Winnipeg |
| Mr. Robert N. Rowson (regular) | Vancouver |
| Mr. J.R. Janzen (regular) | Toronto |
| Dr. Olav H. Loken (regular) | Ottawa |
| Mr. Murray MacKay (student) | Toronto |
| Mr. Bruce Thomson (regular) | Vancouver |

## Nominations for 1991/92

In accordance with By-Law 10(e) of the Canadian Meteorological and Oceanographic Society, I am providing you with a list of nominations for 1991/92:

| | |
|---|---|
| President | Dr. L.A. Hobson |
| Vice-President | Dr. D. Krauel |
| Treasurer | Dr. S. Tabata |
| Corresponding Secretary | Mr. D. Bancroft |
| Recording Secretary | Dr. H. Melling |
| Past President | Ms. N.B. Cutler |
| Councillors-at-Large | |
| Mr. B.D. Lawson, Dr. Kim Tai Tee, Mr. R. Leduc | |

## IMPORTANT NOTICE

### Chairpersons of committees, editorial boards and SIGs

Have you notified the Chairman of the 25th Congress Local Arrangement Committee (Mr. Bevan Lawson, Atmospheric Environment Service, 266 Graham Ave, 10th floor, Winnipeg, Manitoba, R3C 3V4 Tel 416/978-4992 Fax 416/978-8905) whether and when your Committee, Board, SIG will meet on Monday, June 3, at the Delta Winnipeg? If not, please do so as soon as possible and inform the members of your Committee, Board and SIG accordingly. We hope as many as possible will meet!

### Chairpersons of CMOS Centres/Chapters

It is important for as many Chairpersons of CMOS Centres/Chapters as possible to come to the Congress to help us celebrate 25 years of CMOS Congresses and to participate in the CMOS Centre/Chapter Chairpersons meeting which will discuss plans for the next quarter century. If you cannot come, please delegate a member of your Executive or Centre who plans to attend.

## THE FIRST TWENTY FIVE YEARS

Come and help celebrate the 25TH CMOS Congress in Winnipeg, Manitoba, 4-7 June 1991! In addition to interesting papers on northern meteorology and oceanography, the awards Banquet and other traditional Congress events, there will be a special 25th Congress Luncheon. Guest speaker, Morley Thomas (Massey Medal, CMOS Life Member) will review CMOS history and achievements. An exhibition of photos illustrating CMOS history is also planned. Members who have photos of past CMOS Congresses or other events, personalities, etc., are asked to lend them to the local arrangements committee for this purpose. Please send them, with an indication of event and sender to Bevan Lawson, Atmospheric Environment Service, 266 Graham Ave., 10th Floor, Winnipeg, Manitoba, R3C 3V4. All photos will be returned after the Congress.

## Mises en candidature pour 1991/92

Selon les termes de l'Article 10(e) des Règlements de la Société canadienne de météorologie et d'océanographie, je vous fais parvenir la liste des mises en candidature pour 1991/92:

| | |
|---|---|
| Président | Dr. L.A. Hobson |
| Vice-président | Dr. D. Krauel |
| Trésorier | Dr. S. Tabata |
| Secrétaire correspondant | M. D. Bancroft |
| Secrétaire d'assemblée | Dr. H. Melling |
| Président sortant | Ms. N.B. Cutler |
| Conseillers | |
| M. B.D. Lawson, Dr. Kim Tai Tee, M. R. Leduc | |

## AVIS IMPORTANT

### Présidents de comités, comités éditoriaux et groupes spécialisés

Avez-vous averti le président des arrangements locaux du 25ième Congrès (M. Bevan Lawson, Service de l'environnement atmosphérique, 266 avenue Graham, 10 ième étage, Winnipeg, Manitoba, R3C 3V4, Tél: 416-978-4992, Fax: 416-978-8905) si oui, quand votre comité ou groupe se réunira lundi, le 3 juin, au Delta Winnipeg? Si non, prière de le faire au plus tôt et informer les membres de votre comité ou groupe en conséquence. Nous espérons que le plus grand nombre de comités ou groupes se réuniront au Delta Winnipeg, le 3 juin.

### Présidents des centres et chapîtres de la SCMO

Il est très important que le plus grand nombre possible de présidents des centres et chapîtres de la SCMO se rendent à Winnipeg pour célébrer avec nous les vingt-cinq années de la société et pour participer à la réunion des présidents des centres et chapîtres où on discutera des plans pour le prochain quart de siècle. Si vous ne pouvez pas venir, prière de déléguer un membre de votre exécutif ou centre qui planifie y assister.

## LES 25 PREMIÉRE ANNÉES

Venez célébrer avec nous le 25$^{e}$ Congrès de la SCMO à Winnipeg, Manitoba, du 4 au 7 1991. En plus de présentations intéressantes sur la météorologie et l'océanographie nordiques, du banquet de remise des récompenses et des autres activitiés traditionnelles, un déjeuner d'anniversaire aura lieu. Morley Thomas, le conférencier invité, récipiendaire de la médaille Massey et membre à vie de la Société, fera l'historique de la SCMO et de ses réalisations. On prépare aussi une exposition de photos illustrant l'histoire de la SCMO. Nous demandons aux membres qui auraient des photos des congrès antérieurs, des personnalités, etc. de bien vouloir les prêter au Comité d'arrangements locaux. Veuillez les faire parvenir avec les informations pertinentes à Bevan Lawson, Service de l'environnement atmosphérique, 226 Graham Ave., 10th Floor, Winnipeg, Manitoba, R3C 3V4. Les photos vous serons retournées après le Congrès.

## 1991 CMOS Congress Program

Tuesday (June 4)

Plenary Session: The Arctic and Its Climate; Hydrology of the North.

Concurrent Sessions: Fisheries/Biological Oceanography I; Ice in the Arctic Ocean; International Science Programs; International Science Programs; Finite Element Modelling in Oceanography and Limnology; ERICA.

Wednesday (June 5)

Concurrent Sessions: Arctic Oceanography; Numerical Weather Prediction I; Remote Sensing Applications I; Fisheries/Biological Oceanography II; Clouds and Radiation.

Oceanography Plenary: The Physical Features of Arctic Ocean; The Biology of the Arctic Ocean.

Concurrent Sessions: Numerical Weather Prediction II; Chaos and Fractals in Meteorology and Oceanography (after plenary only); Remote Sensing Applications II; Stratospheric Ozone; Fisheries/ Biological Oceanography III.

Thursday (June 6)

Meteorology Plenary: Arctic Air Pollution; Polar Lows.

Concurrent Sessions: Snow and Northern Hydrology; Climate Change I; Upper Atmosphere Phenomena; Coastal and Estuarine Processes; Operational Meteorology; Large Scale Ocean Processes I; Climate Change II; Air Pollution and Boundary Layer Meteorology; Hudson Bay/James Bay Processes; Hydrology/Hydrometeorology.

Friday (June 7)

Concurrent Sessions: Shelf Energy Project; Large Scale Ocean Processes II; Cloud Physics; Currents and Bottom Topography; Arctic Climatology; Radar Meteorology; Large Scale Ocean Process III.

## Canada-China International Mesoscale Workshop

Saturday (June 8)

Sessions: Chinese Climatology; Canadian Climatology; Technology, Observations and Models; Canada - Surface and Upper Air; Canada - Radar; Canada - Satellite; PROFS - Data Management.

Monday (June 10)

Sessions: Canada - Research Models; Canada - Operational Models; China - Mesoscale Forecasting; Canada - Severe Weather Forecasting; PROFS Experimental Forecasts.

Tuesday (June 11)

Sessions: Research & Development Initiatives; China - R&D Programs; Canada R&D Programs; Future Directions and Joint Initiatives.

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## Joint Global Ocean Flux Study

This is a correction to an article in the February 1991 Newsletter (Page 5; paragraph 4). It should read: A Canadian Committee for JGOFS was formed by CNC-SCOR in 1987 (T. Platt and S.E. Calvert (Co-Chairmen), K.L. Denman, M.R. Lewis, K.H. Mann, A.F. Vézina and C.S. Wong).

## WHAT IS A METEOROLOGIST?

This text is from the AMS Bulletin, Vol. 72, No. 1, January 1991:

### A PROFESSIONAL GUIDELINE

A question that has been raised for a long period of time is, "What is a Meteorologist?". This question has been quite common in recent years with regard to individuals referring to themselves as a "meteorologist" on television and radio. After extended discussions, the Council of the American Meteorological Society adopted on 28 September 1990, the following guideline:

> A meteorologist is an individual with specialized education who uses scientific principles to explain, understand, observe or forecast the earth's atmospheric phenomena and/or how the atmosphere affects the earth and life on the planet. This specialized education would be a bachelor's or higher degree in meteorology, or atmospheric science, consistent with the requirements set forth in "The Bachelor's Degree in Meteorology or Atmospheric Science," Bulletin American Meteorological Society, 1987 , Vol. 68, No. 12, p.1570.

There are some cases where an individual has not obtained a B.S. or higher degree in meteorology, but has met the educational requirements set forth in the American Meteorological Society's interpretive Memorandum effective June 1990, Article III, Section 4 (C), and has at least three years professional experience in meteorology. Such an individual can be referred to as a meteorologist.

Activities of meteorologists often are classified into a number of specialized areas. A few examples are: air pollution meteorology, global climate modelling, hydrometeorology, and numerical analysis and forecasting. These activities often require additional specialized education in related subjects.

The designation meteorologist applies to individuals who have attained the professional knowledge outlined above. Individuals who have little formal education in the atmospheric sciences, or who have taken only introductory survey courses, and who disseminated weather information and forecasts prepared by others, are properly designated "weathercasters".

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This topic will be discussed by the Professionalism Committee on June 3 at the 1991 Congress in Winnipeg. If you will not be attending, please send comments to the Chairperson: Mrs. Susan Lally, Oceanroutes canada, 271 Brownlow Ave., Dartmouth, Nova Scotia, B3B 1W6 (Tel: (902) 468-3008; Fax: (902) 468-3009).

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## ****** EDITOR'S COLUMN ******

This is the last Newsletter by the present Editor (Malcolm Still). Please send submissions to the new Editor: Dr. Howard Freeland, Institute of Ocean Sciences, P.O. Box 6000, Sidney, British Columbia, V6L 4B2 (Tel: (604) 356-6590; Fax: (604) 363-6746). The deadline for next issue is June 1, 1991.

## ACA HOLDS ANNUAL MEETING

The 15th Annual General Meeting (AGM) of the Alberta Climatological Association (ACA) was held February 21, 1991 at the Alberta Research Council Facility in Edmonton, Alberta. The topic was on Environmental Monitoring and Instrumentaion for the 1990's. The ACA this year invited manufacturers and distributors of environmental monitoring equipment to participate in the technical session portion of the Annual General Meeting. Ten firms participated with both displays of equipment and short presentations. The attendance at the AGM was about 75 people.

The morning started off with brief presentations by the exhibitors outlining their product line. The technical program continued with the presentation by Dr. John Maybank on "Integrated Weather and Climate Services in the '90's. Dr. Maybank is working with AES Central Region on a special project. He was followed by Mr. Hugh Howe and Mr. Karl Runions of Alberta Environment who gave an excellent presentation on "Installation Procedures for Real Time Networks at Alberta Environment". The afternoon technical session started off with Ben Jans speaking about "Capabilities and Limitations of Automated Data Acquisition Systems". Dr. David Halliwell then spoke about "The Ultimate Answer to Instrumentation, Data Collection, and Everything: What Was the Question?". The technical program concluded with Mr. Peter Kociuba of AES, Edmonton speaking on "AES Guidelines for Auto Stations and Algorithms".

The ACA held its annual business meeting from 3:00 to 4:30. There were 28 members in attendance. The ACA adopted a revised constitution and new bylaws. Anyone interested in joining the Alberta Climatological Association or receiving the proceedings of the 1991 AGM can contact Peter Dzikowksi (President, Alberta Climatological Association), c/o Alberta Agriculture, Rm. 206, 7000 - 113 Street, Edmonton, Alberta, T6H 5T6 (Tel: (403) 422-4385; Fax: (403) 422-0474).

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## Climatological Bulletin
## Bulletin climatologique

Vol. 25, No. 1, April/avril 1991

ARTICLES



NOTES



## CMOS SPECIAL INTEREST GROUP ON FISHERIES OCEANOGRAPHY

Since the founding of the special interest group on Fisheries Oceanography in June, 1990, we have been actively promoting an exhange of ideas on this subject. The first newsletter edited by Keith Thomson (Oceanography, UBC) will be sent to members in early 1991. A bilateral meeting between Japanese and Canadian fisheries oceanographers is being arranged for August, 1991. Funds for this meeting have been applied for under the Japan Science and Technology Fund and a letter in support was obtained from the Vice- President of CMOS, Dr. Louis Hobson.

Although it is not directly a function of the SIG, Fisheries Oceanography, the production of a new journal called "Fisheries Oceanography" to be edited by T. R. Parsons will be of interest to members and it is hoped to offer a subscription to this journal at a reduced society rate to SIG members.

Report by the Co-Chairman, T.R. Parsons

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**Volume 29 No 1 March 1991 Mars**

## ATMOSPHERE-OCEAN

**Contents / Table des matières**

# ACCREDITED CONSULTANTS/EXPERTS-CONSEILS ACCRÉDITÉS

Name & Present Affiliation [Areas of Specialization used for accreditation process]

Dr. Noel Boston
Environment Centre
Ste. 200, 1130 West Pender Street
Vancouver, British Columbia, V6E 4A4 (604/681-8828)
[air-sea-interaction; physical oceanography; training (oceanography); climate change; boundary layer meteorology]

Dr. Anthony J. Bowen
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[training (oceanography); physical oceanography; research (oceanography)]

Dr. Alex Chisholm
197 Compton Avenue
Ottawa, Ontario, K2B 5A8 (613/722-8610)
[research and development (meteorology); atmospheric science policy]

Dr. Han-Ru Cho
Department of Physics, University of Toronto
Toronto, Ontario, M5S 1A7 (416/978-6674)
[cloud physics and chemistry; long range transport of air pollutants; storms; synoptic meteorology; training (meteorology)]

Dr. Brad de Young
Department of Physics, Memorial University of Newfoundland
St. John's, Newfoundland, A1B 3X7 (709/737-8839)
[circulation (oceanography); coastal oceanography; physical oceanography; instrumentation (oceanography); research and development (oceanography)]

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112 Bloor Street
Fredericton, New Brunswick, E3A 2K4 (506//450-8802)
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1959 Upper Water Street
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[research and development (oceanography); waves, tides and surges; coastal circulation; air-sea interaction; marine meteorology]

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218 Alexandra Avenue
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Atmospheric Environment Service, Environment Canada
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Dr. T. R. Oke
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[urban meteorology and climatology; boundary layer; applied climatology; general meteorology]

Mr. George W. Robertson
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[agrometeorology]

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[agrometeorology; boundary layer meteorology; forest; hydrometeorology; instrumentation)

## CONFERENCE SPONSORSHIPS

In accordance with requests received, the following meetings will be co-sponsored by CMOS. Some dates are still tentative.

Canada/China International Mesoscale Workshop
June 8-11, 1991 ..... Winnipeg, Manitoba

5th International Meeting on Statistical Climatology
June 22-26, 1991 ..... Toronto, Ontario

5th International Conference on Precipitation Scavenging and Surface Exchange Processes
July 15-19, 1991 ..... Richland, Washington

Canada/Japan Workshop on Fisheries Oceanography
Summer 1991 ..... Vancouver, British Columbia

2nd WMO Operational Ice Remote Sensing Workshop
September 10-13, 1991 .... Ottawa, Ontario

Workshop on Oceanographic and Environmental Research on Howe Sound
October 1991 ..... Vancouver, British Columbia

11th International Conference on Clouds and Precipitation
August 17-21, 1992 ..... Montreal, Quebec

4th AES/CMOS Operational Meteorology Workshop
September 15-18, 1992 .....Whistler, British Columbia

3rd International Conference on School and Popular Meteorology and Oceanography Education
July 14-18, 1993 ..... Toronto, Ontario

13th International Congress on Biometeorology
September 1993 ..... Calgary, Alberta

# ACCREDITED CONSULTANTS/EXPERTS-CONSEILS ACCRÉDITÉS

Entries on the following pages are restricted to CMOS Accredited Consultants. The accreditation process commenced 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 specialized training:

  (i) post-graduate degree from a recognized university in meteorology or oceanography;

  (ii) post-graduate degree from a recognized 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 specialization included in this document. This should include at least some consulting experience.

Les entrées sur les pages suivantes sont réservées aux experts- conseils accrédités. Le processus d'accréditation a débuté en décembre 1986. Une liste complète des expert-conseils accrédités peut être obtenue du Directeur du Bureau. Les personnes désirant l'accréditation doivent contracter le Director du Bureau de la CMOS à l'adresse de la Société à Newmarket afin de recevoir une copie des Règlements et un formulaire d'application.

Le document "Règlements de la SMCO pour l'accréditation" liste les critères demandés:

(1) L'applicant doit posséder un degré universitaire approprié d'une université reconnue.

(2) L'applicant doit posséder au moins l'un des types suivants de formation spécialisée:

  (i) degré d'une université reconnue, en météorologie ou océanographie;

  (ii) degré d'une université reconnue en sciences naturelles ou appliquées ou en mathématiques, spécialisé dans au moins l'une des branches de la météorologie ou de l'océanographie; ou

  (iii) trois années d'expérience de travail en météorologie ou en océanographie.

(3) Une fois les exigences d'éducation et de formation compétées, l'applicant doit avoir au moins 2 années de performances satisfaisantes, au niveau de travail, dans un champ de spécialisation mentionné dans ce document. Une certaine expérience d'expert-conseil est nécessaire.


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**Warren McCormick, M.A.Sc., P.Eng**
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(for records only: if student, indicate institution and year studies will be completed)
(pour dossiers seulement: l'étudiant doit inscrire le nom de son institution et l'année où il finira ses études)

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| $15.00 | $20.00 | $25.00 | Climatological Bulletin | ☐ Bulletin climatologique | $15.00 | $20.00 | $25.00 |
| $ 0.00 | $15.00 | $15.00 | Annual Congress Program & Abstracts | ☐ Congrès Annuel Programme et Résumés | $ 0.00 | $15.00 | $15.00 |

Note: Students receive one Society publication in their annual fee and must indicate free publication desired. All regular Society publications are sent to Corporate and Sustaining Members. Members resident in Canada, please add 7% GST to annual rate.

Note: Les membres étudiants reçoivent une des publications SCMO et doivent indiquer la publication gratuite désirée. Tous les périodiques sont envoyés aux membres corporatifs et soutiens. Les membres qui résident au Canada, veuillez ajouter 7% (TPS) à l'abonnement annuel.

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Meteorology / Météorologie ☐ Oceanography / Océanographie ☐

## SPECIAL INTEREST GROUP - GROUPE D'INTÉRÊT SPÉCIAL

(Indicate group if interested - Indiquez si vous avez des intérêts dans une groupe)

| | | |
|---|---|---|
| Hydrology / Hydrologie ☐ | Air Pollution / Pollution de l'air ☐ | Agriculture & Forest / Agricole et Forêt ☐ |
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| Fisheries Oceanography / Océanographie des pêches ☐ | | Other (specify) _____ / Autre (stipulez) _____ ☐ |



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Please enroll me as a member of the Society. I attach a cheque for $ _____ payable to the Canadian Meteorological and Oceanographic Society for the membership fee and/or publication subscriptions. I also include a tax-deductible donation of $ _____ for (check one):

☐ The Society's Development Fund

☐ Other (specify) _____

_____
Date

If applying for student membership, please obtain signature of one of your professors.

_____
Date

Mail completed form to CMOS at the address above.

Je désire devenir membre de la Société. J'inclus un chéque au montant de $ _____ payable à la Société Canadienne de Météorologie et d'Océanographie pour la cotisation de membre et/ou des abonnements aux périodiques. J'inclus aussi un don déductible d'impôts de $ _____ pour (indiquez):

☐ Le fonds de développement de la Société

☐ Autre (stipulez) _____

_____
Signature

Si vous désirez devenir membre-étudiant, veuillez obtenir la signature d'un de vos professeurs.

_____
Signature

Faire parvenir à la SCMO la demande d'adhésion complétée à l'adresse au dessus.