



Canadian Meteorological
and Oceanographic
Society

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

La Société Canadienne
de Météorologie et
d'Océanographie

APRIL/AVRIL 1990

VOL. 18 NO. 2

NEWS FROM HEADQUARTERS

This will be the last issue of the Newsletter before the Victoria Congress for which preparations are well advanced. It promises to be an excellent Congress with large number of papers and participants. Reservations for accommodation should be made as early as possible because Victoria will be host of many other meetings at that time and may be crowded. Forms for that purpose and for pre-registration were included in the February Newsletter. Those requiring additional copies can obtain them from the Newsletter Editor. The February Newsletter included also a copy of the CMOS Constitution and By-Laws presently in force. Please bring it with you to the Annual General Meeting in Victoria. If you have not yet renewed your membership, this will be the last Newsletter you will be receiving. So please hurry and renew! The same applies to subscription renewals.

During the last meeting, the Executive heard a report from one of this year's AES/CMOS/DFO Tour Speakers, Mr. David Phillips. His talks, which were given at Centre meetings and banquets and to some public meetings, seem to have been well attended and, knowing his interesting and witty presentation, were certainly appreciated by all listeners. Dr. Peter Zwack is presently speaking to francophone Centres in eastern Canada and we are looking forward to similar reports. Members might be interested to hear that as part of its endeavours to establish contacts and exchanges with other national societies, CMOS has recently agreed to become a "co-operating" member of the Latin America Federation of Meteorological Societies. Other co-operating members are the American and Spanish Meteorological Societies.

I look forward to seeing many of you at the Congress in Victoria.

Uri Schwarz
Executive Director

NOUVELLES DU QUARTIER GÉNÉRAL

C'est la dernière édition du bulletin de Nouvelles de la SCMO avant le congrès de Victoria pour lequel les préparations sont bien avancées. On a lieu de croire que ce sera un excellent congrès avec de nombreuses présentations et des participants en grand nombre. Les réservations pour les hôtels devraient être faites le plus tôt possible à cause d'un grand achalandage car Victoria sera en même temps l'hôte de plusieurs autres réunions. Les formulaires de réservations d'hôtels et pour le pré-enregistrement au congrès étaient inclus avec le bulletin de Nouvelles de février. Ceux qui désirent recevoir des copies additionnelles peuvent en obtenir de l'éditeur du bulletin de Nouvelles. Le bulletin de Nouvelles de février incluait également une copie des règlements de la SCMO présentement en vigueur. Prière de les apporter avec vous à la réunion générale annuelle de Victoria. Ceci sera votre dernière édition du bulletin de Nouvelles que vous recevrez si vous n'avez pas encore renouvelé votre inscription. Prière de le faire très bientôt. Il en est de même pour les renouvellements de souscription.

Pendant sa dernière réunion, l'Exécutif a entendu un rapport d'un de ses conférenciers itinérants SEA/SCMO/MPO, M. David Phillips. Son discours, qui fut présenté aux réunions des différents Centres, à des banquets ainsi qu'à certaines réunions publiques, fut, semble-t-il, bien accueilli, et sachant que sa présentation fut intéressante aussi bien que plaisante, ses propos furent sans aucun doute bien appréciés de tous. Le Dr. Peter Zwack donne présentement des conférences aux Centres francophones de l'est du Canada et nous avons hâte d'entendre des rapports similaires. Les membres seront sans doute intéressés d'apprendre que la société SCMO, dans ses efforts d'établir des contacts et des échanges avec d'autres sociétés nationales, a récemment approuvé une résolution pour devenir membre co-opérant de la Fédération latino-américaine des sociétés météorologiques. Les autres membres co-opérant sont les sociétés de météorologie américaine et espagnole.

Au plaisir de voir plusieurs d'entre vous au Congrès de Victoria.

Votre directeur exécutif
Uri Schwarz

LOCATION OF MEETINGS - CMOS

The following is the schedule of special meetings for the XXIV CMOS Congress. The asterix indicate that those sessions have not been specifically requested but for which meeting rooms have been made available. For additional information: Dr. Rick Marsden, Local Arrangements Committee (Tel: (604) 380-4533).

Summary of Meetings

<u>Committee</u>	<u>Time</u>	<u>Location</u>
<u>Monday 28 May 1990</u>		
*Accreditation	0900-1200	Castle
Publications	0900-1200	G 306
*CHOGUN	0900-1200	Library
Education in Meteorology	0900-1200	G 331
*Membership	0900-1200	G 207
*Professionalism	0900-1200	G 208
Scientific	0900-1200	G 205
*CNC/SCOR	0900-1200	G 206
Atmosphere-Ocean/Climatological Bulletin Editorial Board	1330-1700	G 205
Mesoscale Subcommittee	1330-1700	G 206
SIG: Agricultural and Forest Meteorology	1330-1700	G 207
*SIG: Air Pollution Meteorology	1330-1700	G 208
*SIG: Floating Ice	1330-1700	G 306
*SIG: Hydrology	1330-1700	G 331
SIG: Operational Meteorology	1330-1700	Library
SIG: Fisheries	1330-1700	Mess Decks
*CMOS Chairpersons	1330-1600	Castle
*If necessary		
CMOS - National Council I	1600-1700	Castle
CMOS - National Council II	1600-1700	Castle
Ice-Breaker	1830-2000	Castle ante-room
<u>Tuesday 29 May 1990</u>		
Annual General Meeting	2000-2400	Gymnasium

CHALLENGE

The meteorologists of Canada challenge the oceanographers of Canada to a sailboat race to be held during the 24th Annual Congress at the Royal Roads Military College, Victoria, B.C. The race will be sailed in Albacore class dinghies, 10 of which are available.

RESUMÉ DES RÉUNIONS - SCMO

Ci-joint est l'horaire des réunions spéciales du XXIV ième congrès de la SCMO. Les astérisques indiquent que ces sessions n'ont pas été demandées, cependant, les salles de réunion seront réservées. Pour plus d'information: M. Rick Marsden, Comité des arrangement locaux (Tél: (604) 380-4533).

Résumé des réunions

<u>Comité</u>	<u>Heure</u>	<u>Locale</u>
<u>Lundi le 28 mai 1990</u>		
*Accreditation	0900-1200	Château
Publications	0900-1200	G 306
*CHOGUN	0900-1200	Bibliothèque
Education en météorologie	0900-1200	G 331
*Situation des membres	0900-1200	G 207
*Professionnalisme	0900-1200	G 208
Scientifique	0900-1200	G 205
*CNC/SCOR	0900-1200	G 206
Rédaction d'Atmosphère-Ocean et Bulletin climatologique	1330-1700	G 205
Sous-comité sur l'échelle moyenne	1330-1700	G 206
GIS: Météorologie agricole et forestière	1330-1700	G 207
*GIS: Météorologie de la pollution de l'air	1330-1700	G 208
*GIS: Glaces flottantes	1330-1700	G 306
*GIS: Hydrologie	1300-1700	G 331
GIS: Météorologie d'exploitation	1330-1700	Bibliothèque
GIS: La pêche	1330-1700	Mess des cadets
*Présidents des centres	1330-1600	Château
*Si nécessaire		
Conseil national I	1600-1700	Château
Conseil national II	2000-2400	Château
Réception d'accueil	1900-2100	Château- Antichambre
<u>Mardi le 29 mai 1990</u>		
Assemblée générale annuelle de la SCMO	2000-2400	Gymnase

Volunteer skippers and crews please contact Dr. D.G. Steyn at:
Atmospheric Science Programme
Department of Geography
The University of British Columbia
Vancouver, B.C., V6T 1W5
Tel: (604) 228-6407
Fax: (604) 228-6150

AMS EDITOR'S AWARD

Dr. Andrew N. Staniforth, a Senior Scientist for Environment Canada, has been named a winner of a 1990 American Meteorological Society Editor's Award, and receives the award "for providing exceptionally meritorious reviews of manuscripts submitted to the Monthly Weather Review."

The AMS Editor's Award honours individuals who have contributed outstanding referee's reviews of manuscripts submitted to one of AMS's journals. Its broader purpose is to recognize the painstaking, unheralded work that large portions of the scientific community contribute to preserve the ideals of lucidity and accuracy in scientific writing.

Dr. Staniforth has been employed in various capacities by Environment Canada since receiving his Ph.D. from Western Ontario University in 1973. Most notably, from 1982 through 1985, he headed its numerical prediction research division. Among his major research interests are numerical methods for weather forecasting and environmental modelling, and weather prediction modelling. Dr. Staniforth has also worked on data assimilation at the regional scale. His recent published research has focused almost exclusively on numerical modelling for weather forecasting. In 1987, Dr. Staniforth was a principal contributor to the development of the regional finite element model used by the Canadian Meteorological Centre in short-term forecasting.

MASSEY MEDAL AWARD

Dr. Byron Boville has been awarded the Royal Canadian Geographical Society's Massey Medal for 1990. The Massey Medal is the highest Canadian award given for achievement in geography and related fields. Dr. Boville, a former Environment Canada scientist, won the award for his contribution in starting global action to save the earth's protective ozone layer from destruction by chlorofluorocarbons (CFCs).

Byron was the first Director of the Canadian Climate Centre, Environment Canada in 1979. In 1980, he organized the first United Nations ozone conference and helped bring together scientists and political leaders that resulted in the 1987 Montreal Protocol, an international agreement to reduce CFC use. He also was a senior scientist at the World Meteorological Organization in Geneva where he established worldwide programs to monitor climate change.

WORKSHOP

The Workshop on the Impacts of Climate and Weather on Newfoundland and Labrador was held in St. John's, Newfoundland, November 20-22, 1989, with the purpose of providing a perspective of the impacts of climate and weather, and of discussing means by which Newfoundland society may beneficially adapt to these impacts.

A wide range of specialists presented invited talks within the 3-day workshop. Three panel discussions, moderated by members of the local media, were used to address specific topics of concern. The 135 invited speakers and workshop attendees represented the user-client community of climatological and weather services in Newfoundland, including: climatologists, meteorologists, engineers, oceanographers, urban planners, architects, foresters, agriculturists, hydrological engineers, truckers, fishermen, mariners, aviators and the media. Thirty-five senior high school students, from a number of communities across Newfoundland and Labrador, also participated. The workshop organizers were particularly interested in the participation of the general public. Although the media coverage during the workshop was excellent, the pre-workshop coverage was not sufficient to accomplish this goal.

In the plenary session, *Climate Perspectives*, David Philips (Canadian Climate Centre) and Colin Banfield (Memorial University of Newfoundland) both presented stimulating presentations that resulted in a flurry of television, radio and newspaper interviews. During the next two and a half days, sessions were held on: Meteorological and Weather Forecasting, Meteorological Events and Services, Urban Environment, Energy Conservation, Engineering, Bioresources, Marine Activities, and Health, Leisure and Recreation. At the workshop banquet, Fred Aldrich (Memorial University of Newfoundland) presented an entertaining array of tales regarding the weather of Newfoundland and concluded by stating his firm belief that the provincial government deliberately located the university on the windiest site of the "Rock".

Des O'Neill, Regional Director General, Atlantic Region, Atmospheric Environment Service (AES), provided an outstanding summary of the wide range of subject matter discussed at the workshop. He stated that the workshop clarified that AES must increase its efforts in education to promote an intelligent use of both climatic knowledge and weather services, and involve experts in the practical applications of those efforts. He highlighted a plea (made during a panel discussions) for support to education through speaker programs and the provision of resource materials, and suggested that these would be very worthwhile tasks for the provincial Climate Advisory Committees and CMOS to undertake.

The workshop was organized by the Newfoundland and Labrador Chapter of CMOS and the Newfoundland and Labrador Climate Advisory Committee. Financial sponsorship was provided by the Atmospheric Environment Service, the Canadian Forestry Service, the provincial Departments of Environment and Lands and of Forestry and Agriculture, and Newfoundland Light and Power. The workshop management committee comprised: Keith Thomson (Seaconsult Limited), Chairman, Sandy Robertson (Canadian Forestry Service), Stu Porter (Atmospheric Environment Service), Colin Banfield, and Al Malinauskas (Atmospheric Environment Service). The program committee included: Sandy Robertson, Chairman, Colin Banfield and Charlie Power (Atmospheric Environment Service). The proceedings of the workshop, to be edited by Sandy Robertson, Stu Porter and Colin Banfield, are being prepared as a book consisting of a chapter for each of the workshop sessions.

WHAT'S WOCE

by
Paul LeBlond

WOCE is the World Ocean Circulation Experiment, an enterprise which has been more than a decade in the planning, and which has consumed the energies of hundreds of scientists and of much of the oceanographic infrastructure of most maritime nations. WOCE starts this year, 1990. This first global oceanographic experiment is to last for a decade, with five years of the most extensive-ever sampling of the oceans, accompanied and followed by dedicated efforts at modelling the ocean circulation. The aim of WOCE is to understand the role of oceanic heat transport in the global heat balance. Two fundamental goals have been defined:

GOAL-1. To develop models useful for predicting climate change and to collect the data necessary to test them; and

GOAL-2. To determine the representativeness of the specific WOCE data sets for the long-term behaviour of the ocean, and to find methods of determining long-term changes in the ocean circulation.

The widespread discussion which finally led to the formulation of these goals and to the plans for their implementation has been a scientific saga comparable to planning for the first flight to the moon. I will try to guide you through the genesis of WOCE and to explain how it arose naturally from atmospheric and oceanographic research programs and from questions regarding possible global climate change. We will also see how WOCE followed other research programs and how others have already built upon it. For the sake of brevity, I shall have to cut a few corners and will omit some of the byzantine organizational structure which underlies the birth of WOCE. I will also outline how WOCE plans to implement its objective and how these plans involve the collaboration of oceanographers and meteorologists from many countries. Canadian plans will be presented in some detail.

A Short History of WOCE

How is WOCE related to IGBP (International Geosphere-Biosphere Program) or to JGOFS (Joint Global Ocean Flux Study)? In this age of proliferating international programs concerned with climate change, it is difficult to keep track of all the actors. Although it may be continuously evolving, there is nevertheless a script to this play: some things came first, others were added, improvements are made, complementary studies are introduced, and, in a flow of continuous consultation, the stream of planning oozes majestically forth from the deliberations of international panels, spawning progressively more comprehensive programs labelled by ever more compelling acronyms.

In the beginning, there was the Global Atmospheric Research Program (GARP). Meteorologists, grouped under the banner of WMO (World Meteorological Organization), were among the first to conceive global experiments. Because the ocean imposes a lower boundary condition over 70% of the atmosphere, GARP included some oceanography in GATE (GARP Atlantic Tropical Experiment), and even more in FGGE ("Figgy", First GARP Global Experiment), which studied the southern hemisphere. The focus during that early period was on improving weather prediction. In the 70's, interest shifted to longer time scales and GARP gave way to WCRP (World Climate Research Program). On climatic time scales, the ocean and the atmosphere are linked in a deep thermodynamic embrace. Research on the role of the oceans and of their link with the atmosphere took over the limelight. WOCE and its sister program TOGA (Tropical Ocean Global Atmosphere) were conceived to address the fundamental questions of heat transport in the global heat engine. While TOGA focusses on the tropical ocean and the ENSO phenomenon, WOCE addresses the questions of heat advection by the ocean.

Spatial scales of energetic eddies in the ocean are smaller than in the atmosphere: the equivalent of the 1000 km scale atmospheric synoptic pattern is only 50 km across. This disparity in scales imposes a similar disparity in sampling density and modelling resolution. There are however fewer oceanographers than meteorologists, at least by an order of magnitude. It is also much more difficult and expensive to deploy instruments at sea than on land. To sample the world ocean in a fully eddy-resolving mode for a period of five years was recognized right from the start as an impossible task. Planning for WOCE has thus been a process of developing a consensus on what might be the minimum possible observational level compatible with WOCE's goals. The first step was to specify more precise objectives towards reaching the two goals and to flesh out the plan. At the same time that plans for WOCE were being prepared, it was becoming clear that the ocean's role in exchanging CO₂ with the atmosphere was an extremely important factor in long-term climate change. JGOFS was organized as a broad scale study focusing on CO₂ exchange and recycling in the oceans. WOCE cruises are to make room for JGOFS, which provides a focus for many ocean chemists, geologists and biologists. Canadian scientists are playing a leading role in the formulation of national and international JGOFS plans. Information on JGOFS may be obtained from Trevor Platt at the Bedford Institute of Oceanography (BIO) or Steve Calvert at the University of British Columbia (UBC).

There may be more to climate change than oceanic and atmospheric effects! A broad program to study terrestrial effects and the impact of climate change on natural systems, not included within WOCE's and JGOFS's goals, was launched by the International Council of Scientific Unions under IGBP. WOCE and JGOFS are building blocks for IGBP studies, and WCRP and JGOFS have been declared Core Projects of IGBP. In Canada, leadership of IGBP rests with the Royal Society. The Ocean-Atmosphere Interaction Panel of the Canadian Climate Change Program has identified both WOCE and JGOFS studies as its participation to the IGBP.

The WOCE Objectives

To satisfy the goals of WOCE, a number of specific objectives have been defined. Within Goal-1, the objectives are to determine and understand the following aspects of the World Ocean circulation and their relation to climate:

1. The large-scale fluxes of heat and fresh water, their divergences over 5 years, and their annual and inter-annual variability;
2. The dynamical balance of the World Ocean circulation and its response to changing surface fluxes;
3. The components of ocean variability on months to years, megameters to global scale, and the statistics on smaller scales; and
4. The rates and nature of formation, ventilation and circulation of water masses that influence the climate system on time scales from 10 to 100 years.

Similarly, within Goal-2, these objectives have been formulated:

1. To determine the representativeness of WOCE data sets;
2. To identify those oceanographic parameters, indices and fields that are essential for continuing measurements in a climate-observing system on decadal time scales; and
3. To develop cost-effective techniques suitable for deployment in an ongoing climate observing system.

This is a very ambitious program! In order to reach those objectives, a carefully orchestrated set of observational programs had to be agreed upon by the participating nations and agencies. These are embodied in the Implementation Plan. Action at last!

The WOCE Implementation Plan

To do all the above, WOCE planning has organized the observational program around three core projects. These are described in the WOCE Implementation Plan, published by WMO as a 2-volume document: WCRP-11 (1988) and WCRP-12 (1988).

Core Project-1: The Global Description

The central objective of Core Project-1 is to obtain a global description of ocean circulation so as to provide a basic picture of the circulation and its variability, to relate this to atmospheric forcing, and to refine understanding of ocean dynamics based on the observations and related modelling. The design of the Core Project-1 observational program is based on the following ideas:

1. An estimate of the global circulation can be made by an inversion of the 3-D description of density, temperature, salinity and tracers plus a 2-D description of a deep Lagrangian velocity field and sea surface topography from satellite altimetry;

2. The distribution of eddy kinetic energy in three dimensions will be a strong constraint on oceanic models;
3. Model development is as impeded by the lack of a consistent global description of the air/sea fluxes as of the oceanic dynamical and thermo-dynamical response;
4. The estimation of the annual cycle of heat and fresh water content in the oceanic upper layers globally will be a significant constraint on our estimates of the global air/sea flux fields; and
5. The oceanic meridional heat flux across a given latitude circle estimated for a given year or season around the entire globe will serve as a simple zero order constraint on coupled global atmosphere/ocean models.

Within the Core Project-1, there are a number of components, such as the WOCE Hydrographic Program (which will include a broad network of deep hydrographic sections), a program of satellite altimetry, current meter arrays in strategic locations, and a surface layer program using surface drifters and other instruments. The latter includes the Surface Velocity Program.

Core Project-2: The Southern Ocean

The Southern Ocean is the principal link between the three major oceans and is the site of important deep and bottom water mass formation. The role of Core Project-2 is to improve quantitative estimates of the role of the remote and hostile Southern Ocean in the climate system. Core Project-2 is most interested in the circulation of the circumpolar current system, the mechanisms by which deep and intermediate waters move northward in the absence of western boundaries and the volumes and characteristics of the waters entering and leaving each of the major ocean basins. This project will rely heavily on remote sensing from satellites, arrays of moored instruments and Lagrangian measurements from drifters and floats.

Core Project-3: The Gyre Dynamics Experiments

Core Project-3 is that part of WOCE that will study the processes that must be better understood if decadal climate predictions are to be made by the end of WOCE. The ocean basin selected for the major (but not exclusive) part of Core Project-3 is the Atlantic Ocean. Processes of ventilation, variability, exchanges with marginal seas, atmospheric flux estimates, major boundary current transports have all been identified as important.

The implementation of WOCE depends on the coordinated efforts of many ocean scientists and on the availability and choreography of an impressive array of resources. The France-USA TOPEX-POSEIDON satellite mission will provide accurate measurements of sea-level departure from the geoid to deduce ocean currents. An estimated 25 years of ship time will be needed for sampling at sea. Thousands of satellite-tracked drifters will be launched to track the flow of the upper ocean. A WOCE Scientific Conference, held in Paris in November 1988, led to the crystallization of the implementation plan and to the commitment of sufficient resources to go ahead with the observational program. WOCE is on!!

WOCE in Canada

Canadian scientists took an early interest in international climate projects. Bob Stewart and Warren Godson were influential participants in GARP planning. Stewart chaired the Committee for Climate Change in the Oceans until quite recently. Gordon McBean is now chairman of the Scientific Steering Group of WCRP. On the oceanic side, George Needler and Allyn Clarke of BIO have been closely associated with WOCE planning. George was in charge of the WOCE International Project Office (IPO) from 1986-89 and is now WOCE Chief Scientist at IPO. Allyn is now co-chair of the WOCE Scientific Steering Group and co-chair of the Core Project-1 Working Group. On the west coast, Greg Holloway is an active member of the WOCE Numerical Experimentation Group.

Although interest in WOCE originally centred in the Department of Fisheries and Oceans (DFO) Laboratories at BIO and at the Institute of Ocean Sciences (IOS), academic interest has been blossoming. The Canadian National Committee for WOCE (formed spring 1987) made one of its goals the incorporation of Canadian university researchers within the WOCE program. Workshops to discuss Canadian participation helped in the formulation of preliminary Canadian WOCE plans presented at the November 1988 Paris conference; they also stimulated university researchers to prepare research proposals. A package of 8 proposals for joint university-DFO research was submitted to NSERC in May 1989 and is now in the final stages of assessment.

DFO laboratories at BIO and at IOS will contribute to the WOCE Hydrographic Program by taking responsibility for sampling sections to WOCE standards in the Atlantic and the Pacific. Some of these are once-only sections: the 48°N and 60°N zonal sections and the Cape Farewell-Azores meridional section in the North Atlantic, and the 170°W meridional section from Alaska to the equator in the North Pacific; others off Canada's east and west coast will be sampled on a seasonal basis over 5 years. John Lazier, Allyn Clarke, Ross Hendry and Peter Jones (BIO), and Rick Thomson and Howard Freeland (IOS) will oversee the hydrographic program. The once-only sections will require 150 ship days, while the repeat sections will need 80 ship days annually. In addition, concentrated hydrographic and tracer surveys within a Core Project-3 control volume box in the southern Labrador Sea and western North Atlantic will use 120 ship days over 2 years.

Contributions to the Surface Layer Program will include a series of programs out of BIO: measurements of air-sea fluxes over the North Atlantic (Fred Dobson and Stu Smith), continuation of an XBT (expendable bathythermograph) section from Halifax to Iceland (F. Dobson), and plans to maintain a robust temperature/salinity chain in the central Labrador Sea over each winter. Owen Hertzmann (Dalhousie) and Fred Dobson (BIO) have proposed precipitation measurements over the North Atlantic.

Gordon McBean (UBC), Tad Murty (IOS) and Maurice Danard (University of Victoria) propose to map forcing fields over the North Pacific. As a Canadian contribution to the Surface Velocity Program in the Pacific, Paul LeBlond (UBC), Bill Large (NCAR), Rick Thomson (IOS), David Krauel (Royal Roads) and Gordon Swaters (U. Alberta) propose to deploy drifters to monitor surface flow in the Alaskan Gyre. Deep ocean moorings will also be set by DFO scientists across the North Atlantic current and in the northeast Pacific to monitor flow variability during a few years of the WOCE field program.

Process studies associated with Core Project-3 studies in the Atlantic will involve Barry Ruddick (Dalhousie) and Neil Oakey (BIO) who will participate in the Tracer Release Experiment with planned turbulence and microstructure measurements. Eddy Carmack (IOS) plans to participate in a survey of dense water formation in the northwest Pacific off the Kamchatka Peninsula and in the Okhotsk Sea in a collaboration with the USSR.

Modelling efforts will be carried out to improve understanding of the North Atlantic circulation in projects involving a collaboration between Richard Greatbatch (Memorial Univ.), Dan Kelley and Keith Thomson (Dalhousie), Charles Lin (McGill) and Dan Wright (BIO). William Hsieh (UBC) and Greg Holloway (IOS) propose to model the North Pacific circulation in numerical studies relating to the oceanic response to atmospheric forcing and methods of data assimilation. Other modelling efforts at IOS will involve Mike Foreman and Patrick Cummins.

Many of these studies will require ship time. Including the times mentioned above, a total of 328 ship days will be required in the North Atlantic over the period 1990-1995. The corresponding number for the Pacific is 680 ship days. Funding for the DFO cruises and other research activities identified with WOCE is a part of the ongoing operations and research budget, amounting to over \$20M over 5 years. Projects including university participation have been submitted for funding to the NSERC Collaborative Research Initiatives Program. Requests total \$3M over 5 years. By comparison, funding requested for WOCE research in the USA is about \$US 200M; a rough estimate of the global WOCE budget would be about \$US 500M.

A report of WOCE progress is to be presented at the 1990 CMOS Congress in Victoria. By then, funding will be firm and sampling will even have begun in some areas.

EDITOR'S COLUMN

The Editor would like to see articles on meetings, global projects, special interest groups or any topic that may be of interest to our membership. Black and white photographs or diagrams are welcomed. Authors who wish to submit by computer disk, please contact the Editor to ascertain the wordprocessing packages that can be accepted. Items for the Newsletter should be sent to Malcolm Still, Atmospheric Environment Service, 4905 Dufferin Street, Downsview, Ontario M3H 5T4 (Tel: (416) 739-4866). The deadline for next issue is June 1, 1990.

INTERNATIONAL SYMPOSIUM

The International Symposium on Operational Fisheries Oceanography (ISOFO) was held in St. John's, Newfoundland, October 23-27, 1989. Operational Fisheries Oceanography is the provision of services to minimize search time and to direct fleets and fishing vessels to areas of optimal availability of the desired species, based on a knowledge of the behaviour of the targetted species under different environmental conditions, the ocean environment, and fleet and vessel deployment strategies.

Two hundred and thirty fisheries scientists, oceanographers, equipment manufacturers and suppliers, and fishermen from over 30 nations visited St. John's to participate in this international, multi-disciplinary symposium.

Eight plenary speakers presented key-note papers: William Doubleday, Assistant Deputy Minister (Science), Department of Fisheries and Oceans ("Perspectives of Operational Fisheries Oceanography in Canada"); Sherman Chow, Communications Research Centre, Department of Communications ("New Developments in Marine Data Communications for Oceanography"); Toshiyuki Hirano, President, Japanese Society of Fisheries Oceanography ("The Current Situation and Future Plans for Operational Fisheries Oceanography in Japan"); Taivo Laevastu, Northwest and Alaska Fisheries Center, Seattle ("Perspectives of Services to Fisheries: A Review of the Objectives and Needs of Fisheries Analysis/Forecasting Services"); Michael Laurs, National Marine Fisheries Service, La Jolla ("Operational Fisheries Oceanography Experiments; The Development of a New Albacore Tuna Fishery in the South Pacific"); William Leggett, Dean of Science, McGill University ("Toward a Scientific Basis for Fisheries Oceanography Services"); James Simpson, Scripps Institute of Oceanography ("Remote Sensing in Fisheries: A Tool for Better Management in the Utilization of a Renewable Resource"); and Yuri Zonov, Deputy Director, All-Union Research Institute of Marine Fisheries and Oceanography, Moscow ("Operational Fisheries Oceanography in the USSR").

Sixty five papers were presented on the following topics: Scientific Basis for Operational Fisheries Oceanography, Data Acquisition, Data Services, Operational Support Products, Marine Data Communications, Fisheries Management Implications, Inshore Fisheries, Operational Fisheries Oceanography Experiments and Services, and Fleet and Vessel Deployment Strategies. Four stimulating workshops were held: The Implications of Operational Fisheries Oceanography to Fisheries (Chair: John Davis, Department of Fisheries and Oceans); Data Acquisition and Dissemination: The Future (Chair: Carl Berman, IGOSS Operations Coordinator, UNESCO, Paris); The Scientific Basis of Operational Fisheries Oceanography: Research Directions (Chair: David Cushing, United Kingdom); and Operational Fisheries Oceanography Services of the Future (Chair: Taivo Laevastu).

In addition, a full slate of social events tested the stamina of ISOFO participants and organizers, including: a reception at the Northwest Atlantic Fisheries Centre (Host: Mac Mercer, Regional Director, Science, Newfoundland Region, Department of Fisheries and Oceans); a plenary poster session (45 posters) with a traditional Newfoundland "Screech-In" (in which all of our first-time Newfoundland visitors enthusiastically became Honourary Newfoundlanders); and a banquet where David Cushing presented a humorous romp through his long and distinguished career as a fisheries oceanographer.

ISOFO was organized as a joint venture of the Department of Fisheries and Oceans (Northwest Atlantic Fisheries Centre, St. John's, Newfoundland) and Seaconsult Limited (St. John's, Newfoundland), and was sponsored by the Canadian Meteorological and Oceanographic Society (Newfoundland and Labrador Chapter), the Intergovernmental Oceanographic Commission, the National Oceanic and Atmospheric Administration, and the Atlantic Canada Opportunities Agency.

The ISOFO Steering Committee was chaired by Larry Coady (Northwest Atlantic Fisheries Centre) and Laurie Davidson (Seaconsult Limited); the Scientific and Technical Programme Committee was chaired by Keith Thomson (Seaconsult Limited) and Scott Akenhead (Northwest Atlantic Fisheries Centre); and the Local Arrangements Committee was chaired by Jim Dempsey (Seaconsult Limited).

Scott Akenhead and Keith Thomson are co-editing two ISOFO publications: a special publication of the Canadian Journal of Fisheries and Aquatic Sciences comprising of refereed papers and notes (thirty-one papers have been submitted); and a book, Operational Fisheries Oceanography comprising of theme chapters written by the ISOFO plenary speakers. The book is intended to be a state-of-the-art perspective of Operational Fisheries Oceanography that may be utilized by a much broader audience than a set of proceedings or a scientific journal.

ISOFO was considered a highly successful and worthwhile symposium by all participants. Numerous parties are looking forward to a repeat performance in the not-too-distant future.

SPECIAL INTEREST GROUP

All CMOS members interested in participating in a CMOS Special Interest Group for Fisheries Oceanography are asked to attend a meeting during the 1990 CMOS Annual Congress at Royal Roads Military College (date and time to be announced in Congress schedule).

The purpose of the meeting is to determine if there is sufficient interest within CMOS to form such a group and, if so, to draft its terms of reference.

Any interested members that will not be able to attend this meeting are asked to contact Scott Akenhead at the Northwest Atlantic Fisheries Centre (phone: 709-772-2063, fax: 709-772-2156).

CANADIAN MESOSCALE ACTIVITIES

Report of CMOS Mesoscale Sub-Committee

Introduction

Every region of Canada experiences major precipitation and severe weather events. For example, over the past few years, floods devastated southern Ontario, tornadoes struck the Prairies, heavy snow downed power lines in Quebec, intense cyclonic storms brought hurricane-force winds to Atlantic Canada, and substantial snow fell along the British Columbia coastline. Such weather events are examples of mesoscale phenomena which occur on scales up to a few hundred kilometres.

Mesoscale phenomena affect society in many ways. Human lives may be lost, industries are sometimes crippled, transportation is disrupted, and activities are cancelled or delayed. The dependence of Canadian society upon the weather decreases the nation's ability to compete in the modern world by diverting resources to coping with such weather events rather than to producing goods and services. Better prediction would save lives and property and would increase our efficiency.

In addition, society is becoming more aware of our fragile existence on Earth. Pollution is seen to be both a hazard to health and as the major ingredient in the alteration of the entire climate upon which we all depend. The transport and deposition of pollutants are largely governed by mesoscale weather processes which must be understood if we are to provide policy advice on pollutant movement. The global climate itself can be considered to be the net result of the collective actions and interactions of many processes; much as an election is determined by the sum total of individual actions. We therefore have no hope of understanding the implications of pollution on our global climate without a greatly increased effort in the understanding of the critical mesoscale processes.

Because of the importance of mesoscale phenomena to Canadian society, in particular, and to the global climate, in general, it is crucial that an action plan for Canadian mesoscale studies be developed. About 5 years ago the Canadian Meteorological and Oceanographic Society (CMOS) had suggested a number of mesoscale activities that should be undertaken. The Canadian Atlantic Storms Program (CASP) was one response and was mounted in order to better understand East Coast storms and to improve the prediction of their occurrence, structure, and oceanic response.

This document presents the CMOS Mesoscale Sub-Committee's recommendations for mesoscale meteorological activities over the next few years. The recommendations have been formulated through ongoing discussions within the Sub-Committee and with many other interested individuals.

Scientific Issues and Opportunities

We live in an exciting period in the history of meteorology and oceanography. Instruments are available to accurately measure many mesoscale meteorological and comparable oceanographic parameters. Examples include Doppler radar, wind profilers, and radiometers. Soon, rawinsondes using satellite positioning will allow for unprecedented wind-finding accuracy, and, before the end of the century, active sensors such as radars and Doppler lidars will be orbiting the earth as part of the earth observing system. As well, meteorology has never been so well equipped to numerically simulate features using super-computers which will only give way to even more powerful machines.

The nature and impact of some of the major weather events that affect Canada are currently being examined. A goal of the Atmospheric Environment Service (AES) is to improve short-term forecasts through better use of technology and science with a particular emphasis on saving lives and property. Observing capabilities are being enhanced through advances in radar and other remote sensing technologies. In addition, university, other government and private industry groups are studying many aspects of Canadian weather ranging from oceanographic and hydrological consequences to the structure of the upper atmosphere.

Major steps are being taken to deal with weather problems in other areas of the world. The United States has launched a decade-long STORM project with the aim of better understanding, predicting, and dealing with mesoscale weather events in their country. In tandem, they have embarked on a major program to acquire new observing facilities such as Doppler radars and profilers, and have begun to improve their communications and dissemination systems for weather information.

The 1990s have also been designated by the United Nations as the International Decade of Natural Hazard Reduction. Canadian progress in understanding and confronting its own, sometimes catastrophic, weather could often be transferrable to other countries. Present day realities dictate that Canada must compete internationally. The country cannot afford to benignly accept the consequences of the weather but must use information from forefront mesoscale studies to achieve a more efficient and competitive national economy.

Objectives

The objectives of the Canadian efforts in mesoscale meteorology are as follows:

- (a) To better understand precipitating and severe weather systems;
- (b) To apply this understanding towards improving the forecasting of mesoscale atmospheric and oceanic phenomena; and
- (c) To apply this understanding to environmental problems such as air quality, climate change and emergency responses.

As a means of achieving these objectives, the following sub-objectives should also be emphasized:

- (a) To improve the tools for observing, analyzing and modelling mesoscale phenomena; and
- (b) To strengthen expertise through education and training and with increased research-operations interactions.

Recommendations

In order to achieve the objectives, the following actions are proposed:

- (a) Conduct field experiments into mesoscale phenomena in all areas of Canada which have outstanding weather problems and for which suitable efforts can be mounted. Field efforts focus the efforts of all participants by allowing them to share enhanced data sets and thereby improve the rate at which progress is made in all areas.

Because of the impending STORM program in the United States, a special effort must be taken to profit from this program in Canada. A project in central Canada, just downwind of the vast STORM 1 effort, should be considered for the winter/spring of 1992. The project should include an air quality component. Severe summer weather on the Prairies and/or central Canada should be studied in the summer of 1993 to take advantage of the summer phase of STORM 1. These Canadian projects need not be large. However, they would provide an opportunity for joint North American projects; the weather does not recognize international boundaries. Such projects would also serve as the basis for larger efforts later in the decade.

Because a highly focussed study can be mounted on the basis of past results, CASP II should be conducted in the winter/spring of 1992 over and just offshore Newfoundland. This project should concentrate on the interactions between the storms, coastlines, coastal ocean and sea ice.

Severe marine weather is also a problem on the west coast. Of major concern is the rapid development of storms and their interaction with the coastline and mountains. Beginning as soon as possible, the present marine observing network should be augmented in a field project designed to explore specific hypotheses regarding such storms. This effort could lead to larger-scale, more intensive, experiments later in the decade. Summer convection over the interior of British Columbia should also be examined in later studies of Pacific region mesoscale phenomena.

- (b) Partnerships need to be formed between different groups, i.e., government, university and industry. The aim would be to achieve a "critical mass" by combining the expertise of different groups in order to shorten the track between basic understanding and application.

Particular emphasis should be placed on operational research cooperation. Results from scientific progress may then be readily fed into operational uses, whereas operational experience can also be appreciated by the research community. This cooperation would also serve to evaluate the consequences of new data sources and to lay the groundwork for short-term intensive field projects.

- (c) Linkages between mesoscale processes and climate must be understood. All field experiments aimed at mesoscale phenomena should have a climate component. For example, a study aimed at improving our understanding of the coupling between the atmosphere, ocean and sea ice should involve climate researchers who are concerned with this coupling from a global perspective. In addition, Arctic mesoscale studies should be considered with a view towards appreciating their linkage to climate.
- (d) Observing facilities in Canada are incapable of providing the needed mesoscale information. A critical need exists for a portable Doppler radar and wind profilers to measure the kinematic and precipitation characteristics of mesoscale phenomena. These instruments, as well as others such as a portable mesonet and portable rawinsonde systems, require adequate maintenance. The mesoscale data produced from such systems must furthermore be suitably processed and distributed.
- (e) Numerical modelling of mesoscale phenomena is an essential component of mesoscale studies. This approach represents the final demonstration of our ability to understand mesoscale phenomena. Although much of the numerical modelling must remain in government because of operational considerations, modelling research by other groups must also be encouraged. Special consideration should be given to the possibility of ready availability of some models by the community at large.
- (f) Education in mesoscale studies must be encouraged. Too few people in Canada are experienced in the many facets of this field. The success of a mesoscale effort is probably limited more by the lack of trained investigators than by any other factor.
- (g) As a professional society representing diverse Canadian interests, CMOS should continue to encourage the mesoscale activities. It should inform the public and funding agencies why mesoscale phenomena are so important to the country's well-being, and it should sponsor meetings where actions needed to fulfill the mesoscale recommendations are discussed.

Concluding Remarks

Canada is subjected to a wide variety of economic and social problems due to its weather and many Canadians are concerned that our global climate is changing. Now is the appropriate time to tackle these weather-related problems from a national perspective and on a priority basis reflecting opportunities for advancement. In this manner, scarce resources of manpower, observing facilities, and modelling efforts can be used efficiently.

By focussing present efforts and by working together, a better understanding and prediction of Canadian weather and its linkage to climate can be realized. All Canadians will be the winners in this effort: their personal safety will be enhanced and their shared environment will be better protected and predicted.

CMOS MESOSCALE SUB-COMMITTEE

FURTHER INFORMATION REGARDING THE RECOMMENDATIONS

Actions for implementing the mesoscale recommendations have already begun. Several people have prepared draft plans for field projects in all areas of the country, and a meeting to discuss plans for some of the field studies was held on April 9-10. If you would like additional information on the mesoscale recommendations, please contact Dr. Ronald Stewart, CMOS Mesoscale SubCommittee Chairman, Cloud Physics Research Division, Atmospheric Environment Service, Downsview, Ontario M3H 5T4.

POSITION VACANCIES

RESEARCH ASSOCIATE/POSTDOCTORAL POSITIONS

The physical oceanography group* at Dalhousie University is currently interested in a wide range of research topics including ocean stirring and mixing, nearshore processes, wind-driven shelf and ocean circulation, and exchange between marginal seas and the deep ocean. The recent establishment of an atmospheric sciences program at Dalhousie, and the funding of a centre of excellence in fisheries research, provide additional research opportunities for post-Ph.D. physical oceanographers interested in topics such as air-sea interaction and the physical-biological processes involved in recruitment to North Atlantic fish stocks.

We, therefore, invite applications for research in any of the above areas. Interest in interdisciplinary work is an asset but not essential. Curricula vitae and the names, addresses and phone numbers of three referees should be sent to:

Jackie Hurst
Department of Oceanography
Dalhousie University
Halifax, Nova Scotia
Canada B3H 4J1

Tel: (902) 494-8834; Fax: (902) 494-3877

*(Tony Bowen, Chris Garrett, Dan Kelley, Barry Ruddick and Keith Thompson)



METEOROLOGICAL INSTRUMENTS

SINCE 1964



SENSORS TO MEASURE:

- Wind Speed, Peak Gusts
- Wind Direction, Variability
- Temperature, Delta T
- Dew Point, Relative Humidity
- Precipitation

INDICATORS/RECORDABLE OUTPUTS

R.M. YOUNG COMPANY

2801 AERO PARK DRIVE, TRAVERSE CITY, MI 49684, U.S.A.
PHONE 616-946-3980 TWX 810-291-3366
FAX 616-946-4772

NEW CMOS MEMBERS

These new members were approved March 23, 1990:

Mr. Gary V. Winters (regular)	Halifax
Mr. Hal Heatherington (regular)	Toronto
Dr. V.P. Tereschukov (regular)	USSR
Dr. David Schneider (regular)	Newfoundland
Dr. Monique Tanguay (regular)	Montreal
Miss Shiling Peng (student)	Montreal
Mr. Terrence F. Mullane (regular)	Ottawa
Mr. Greg Crawford (student)	Vancouver

These new members were approved April 11, 1990:

Dr. Stephen R. Phillips (regular)	Saskatoon
Mr. Paul Andrew Makar (student)	Toronto
M. Jean Seka (student)	Rimouski
Dr. Langley R. Muir (regular)	Ottawa
Dr. Norman Donaldson (regular)	Toronto

ADVERTISING RATES

Rates are based on black and white camera-ready copy. Sizes (inches) are full page (7.5x9.5), 1/2 page (3.5x9.5) and 1/4 page (3.5x4.5). Other charges apply where typesetting or artwork are required. Distribution per issue is nearly 1000.

Advertisement Type

	<u>Full Page</u>	<u>1/2 Page</u>	<u>1/4 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.

ACCREDITED CONSULTANTS

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.

Noel Boston, P.Eng., Ph.D.

CMOS Accredited Consultant

Physical Oceanography, Boundary Layer Meteorology,
Training

The Environment Centre
Suite 200 - 1130 West Pender Street
Vancouver, British Columbia V6E 4A4 Canada
Tel: (604) 681-8828 Fax: (604) 681-6825

David R. Hudak, Ph.D.

CMOS Accredited Consultant

Cloud Physics, Synoptic Meteorology,
Weather Modification

KelResearch Corporation
850-A Alness Street, Suite 9
Downsview, Ontario M3J 2H5 Canada
Tel: (416) 736-0521

ACCREDITED CONSULTANTS

Susan K. Lally
CMOS Accredited Consultant
General Meteorology, Marine Meteorology

Oceanroutes Canada Inc.
Swire House, 271 Brownlow Avenue
Dartmouth, Nova Scotia B3B 1W6 Canada
Tel: (902) 468-3008 Fax: (902) 468-3009

Tom B. Low, Ph.D., P.Eng.
CMOS Accredited Consultant
Research and Development Meteorology

KelResearch Corporation
850-A Alness Street, Suite 9
Downsview, Ontario M3J 2H5 Canada
Tel: (416) 736-0521

Ian J. Miller, M.Sc.

CMOS Accredited Consultant
Marine Meteorology and Climatology, Applied Meteorology
and Climatology, Storms, Waves, Operational Meteorology

MacLaren Plansearch Limited
Suite 701, Purdy's Wharf Tower
1959 Upper Water Street
Halifax, Nova Scotia B3J 3N2 Canada
Tel: (902) 421-3200 Telex: 019-22718

Prof. T.R. Oke, B.Sc., M.A., Ph.D.

CMOS Accredited Consultant
Urban Meteorology & Climatology
Boundary-Layer, Applied Climatology

3776 West 39th Avenue
Vancouver, British Columbia V6N 3A7 Canada
Tel: (604) 228-2900 Res: (604) 263-7394

Douw G. Steyn, Ph.D.

CMOS Accredited Consultant
Air Pollution Meteorology, Boundary Layer Meteorology
Meso-Scale Meteorology

3650 Carnarvon Street
Vancouver, British Columbia V6L 3E4 Canada
Tel: (604) 228-6407 Home: (604) 733-1255

Brian Wannamaker

CMOS Accredited Consultant
Remote Sensing, Instrumentation (oceanography),
Physical Oceanography, Sea Ice/Icebergs

Sea Scan
R.R. 3,
Caledon East, Ontario L0N 1E0 Canada
Tel: (416) 880-0528

Bassem M. Eid, P.Eng., Ph.D

CMOS Accredited Consultant
Coastal Circulation, Waves/Tides/Surges,
Air-Sea Interaction, Marine Meteorology

MacLaren Plansearch Limited
Suite 701, Purdy's Wharf Tower
1959 Upper Water Street
Halifax, Nova Scotia B3J 3N2 Canada
Tel: (902) 421-3200 Telex: 019-22718

Terry J. Gillespie, Ph.D.

CMOS Accredited Consultant
Agricultural Meteorology & Land Planning,
Agrometeorological Training

51 Applewood Crescent
Guelph, Ontario N1H 6B3 Canada
Tel: (519) 824-4210 Ext 2645 or (519) 824-9504

ACCREDITED CONSULTANTS

Mory Hirt

CMOS Accredited Consultant

Applied, Aviation & Operational Meteorology,
Research & Development, General Project Management

World Weatherwatch
7050 Woodbine Avenue, Suite 100
Markham, Ontario L3R 4G8 Canada
Tel: (416) 477-4120 Telex:06-966599(MEP MKHM)

T.W. (Terry) Krauss, Ph.D.

CMOS Accredited Consultant

Cloud Physics, Radar, Weather Modification,
Storms, Research & Development

INTERA Technologies Ltd.
2500, 101-6th Avenue S.W.
Calgary, Alberta T2P 3P4 Canada
Tel: (403) 266-0900

R.B.B. Dickison

CMOS Accredited Consultant

Boundary-Layer Meteorology, Synoptic Meteorology
Agrometeorology, Hydrometeorology, Forest Meteorology

Atlantic Weather & Environmental Consultants Ltd.
112 Bloor Street
Fredericton, New Brunswick E3A 2K4 Canada
Tel: (506) 450-8802

Richard J. Kolomeychuk, M.Sc.

CMOS Accredited Consultant

Applied Meteorology and Climatology
Hydrometeorology

The Environmental Applications Group Ltd.
Suite 1006, P.O. Box 2041, 20 Eglinton Ave. W.
Toronto, Ontario M4R 1K8
Tel: (416) 322-5701 Fax: (416) 322-5706

Mike Lepage, M.S.

CMOS Accredited Consultant

Wind Engineering, Climatic Data Management,
Air Pollution Meteorology, Climate Research

Rowan Williams Davies & Irwin Inc.
650 Woodlawn Road West
Guelph, Ontario N1K 1B8 Canada
Tel: (519) 823-1311 Fax: (519) 823-1316

John E. Letkeman

CMOS Accredited Consultant

Air Quality Meteorology

Radian Corporation
8501 MoPac Blvd.
Austin, Texas, USA 78720-1088
Tel: (512) 454-4797

Andrew H. Gillam, Ph.D.

CMOS Accredited Consultant

Marine Chemistry
Environmental Audit, Assessment and Monitoring

CBR International
Suite 101, 9865 W. Saanich Road
Sidney, British Columbia V8L 3S3 Canada
Tel: (604) 655-1944 Fax: (604) 655-7131

La Société Canadienne de Météorologie et d'Océanographie The Canadian Meteorological and Oceanographic Society

La Société Canadienne de Météorologie et d'Océanographie (SCMO) a pour but de stimuler tous les aspects de la météorologie et de l'océanographie au Canada. Sa constitution date de juin 1977, alors que la Société Canadienne de Météorologie, établie en janvier 1967, a reconnu la croissance et les contributions dues à l'activité de sa section d'océanographie et a changé son nom. Toute personne ou organisation intéressée à la météorologie et/ou à l'océanographie peut en devenir membre. Les treize centres locaux et sections de la Société fournissent aux membres autant de lieux pour discuter et recevoir des conférenciers invités. Les membres qui ont des intérêts particuliers à l'hydrologie, à la pollution de l'air, à l'agriculture, à la météorologie d'exploitation ou à la glace dérivante sont encouragés à joindre des groupes d'intérêts spéciaux au sein de la Société.

La Société organise un Congrès annuel au printemps d'une durée de trois jours où l'on présente et discute des exposés, où l'on distribue des récompenses et où l'on tient la réunion générale annuelle. L'emplacement choisit pour le congrès varie selon le centre qui en est l'hôte. La Société publie trois périodiques, comprenant le Bulletin de nouvelles de la SCMO. Le Bulletin publie des lettres, des avis, des revues de livres et d'autres communications d'intérêt pour les membres. ATMOSPHERE-OCEAN est le journal scientifique trimestriel qui renferme des articles sur tous les aspects de la météorologie et de l'océanographie, de même que des notes, lettres et revues de livres appropriées. Le Bulletin climatologique est un journal qui renferme des articles et des notes d'intérêt sur la climatologie. Il est publié trois fois par année. Le Bulletin de nouvelles de la SCMO est distribué sans frais additionnels à tous les membres.

Les demandes d'adhésion sont approuvées par le bureau d'administration à ses réunions mensuelles. Les demandes d'adhésion et d'abonnement reçues après le 1^{er} octobre sont pour l'année suivante.

Le Conseil de la SCMO pour 1989/90

Président	Dr. Han-Ru Cho
Vice-Président	Mme Nancy Cutler
Trésorier	M. Bruno De Lorenzis
Secrétaire correspondant	M. Howard Kagawa
Secrétaire d'assemblée	M. William Schertzer
Président sortant	Dr. Jim Young
Conseillers	M. S.A. Akenhead M. W.D. Hume Dr. R.F. Marsden
Directeur exécutif	M. Uri Schwarz

(903-151 Slater Street, Ottawa, Ontario, K1P 5H3)
(Tél: (613) 990-0300)

The Canadian Meteorological and Oceanographic Society (CMOS) exists to advance all aspects of meteorology and oceanography in Canada. It assumed its present constitution in June 1977. This development recognized the growth and contributions of an active Oceanographic section within the parent Canadian Meteorological Society established in 1967. Membership in the Society is open to individuals and organizations with interests in the fields of meteorology and/or oceanography. Through its thirteen local Centres and Chapters, the Society provides a forum for members to participate in discussions and hear guest speakers. Members with special interests in the fields of hydrology, air pollution, agriculture, operational meteorology or floating ice are encouraged to join Special Interest Groups within the Society.

The Society sponsors an annual Congress each spring, usually lasting three days, where papers are presented and discussed, various awards are given, and the yearly business meeting is held. The location of the Congress varies, with the local Centres serving as hosts. The Society publishes three periodicals, including the CMOS Newsletter. The Newsletter carries correspondence, notices, book reviews and other items of general interest to members. ATMOSPHERE-OCEAN is a quarterly scientific journal containing articles on all aspects of meteorology and oceanography as well as relevant notes, correspondence, and book reviews. The Climatological Bulletin contains articles and notes of particular interest to the field of climatology and is published three times a year. The Newsletter is distributed free to all members.

New members are accepted into the Society by the National Executive at their monthly meetings. Applications and subscriptions received after October 1 are for the following year.

CMOS 1989/90 Council

President	Dr. Han-Ru Cho
Vice-President	Mrs. Nancy Cutler
Treasurer	Mr. Bruno De Lorenzis
Corresponding Secretary	Mr. Howard Kagawa
Recording Secretary	Mr. William Schertzer
Past President	Dr. Jim Young
Councillors-at-large	Mr. S.A. Akenhead Mr. W.D. Hume Dr. R.F. Marsden
Executive Director	Mr. Uri Schwarz

(903-151 Slater Street, Ottawa, Ontario, K1P 5H3)
(Tel: (613) 990-0300)

1990 MEMBERSHIP APPLICATION FORM - DEMANDE D'ADHÉSION 1990

(Please print in block letters - Lettres moulées s.v.p.)

Title/Titre Dr ___ Mr ___ Mrs ___ Miss ___ Ms ___
 M ___ Mme ___ Mlle ___

Name/Nom _____

Address/Adresse _____

Telephone/Téléphone res./maison _____ bus./travail _____

Occupation/Emploi _____
 (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)

MEMBERSHIP CATEGORY - CATÉGORIE DE MEMBRE
 ANNUAL FEES - COTISATION ANNUELLES
 (Please check one - Cochez un s.v.p.)

- Regular Régulier \$30.00
- Student Étudiant \$20.00
- Corporate Corporation \$150.00 (minimum)
- Sustaining Soutien \$125.00 (minimum)

PUBLICATION SUBSCRIPTIONS - ABONNEMENT AUX PÉRIODIQUES ANNUAL RATES -ABONNEMENTS ANNUELS

<u>Members</u>	<u>Non-Members</u>	<u>Institutions</u>		<input type="checkbox"/>		<u>Membres</u>	<u>Non-Membres</u>	<u>Institutions</u>
\$20.00	\$30.00	\$55.00	ATMOSPHERE-OCEAN	<input type="checkbox"/>	ATMOSPHERE-OCEAN	\$20.00	\$30.00	\$55.00
\$12.00	\$15.00	\$20.00	Climatological Bulletin	<input type="checkbox"/>	Bulletin climatologique	\$12.00	\$15.00	\$20.00
\$ 0.00	\$15.00	\$15.00	Annual Congress Program & Abstracts	<input type="checkbox"/>	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.

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.

PRIMARY FIELD OF INTEREST - SPHERE D'INTÉRÊT PRINCIPAL

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

Operational Meteorology
 Météorologie d'exploitation

Floating Ice
 Glace dérivante

Other (specify) _____
 Autre (stipulez) _____

APRIL/AVRIL	Vol 18 No.2
-------------	-------------

See over/au verso

CMOS-SCMO
P.O. Box/C.P. 334
Newmarket, Ontario.
L3Y 4X7
Canada



W1028 1
Mr. M.K. Thomas
15 Lewes Cres.
TORONTO ON
M4N 3J1

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 chèque 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.