



Canadian Meteorological
and Oceanographic
Society

La Société canadienne
de météorologie et
d'océanographie

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

DECEMBER/DÉCEMBRE 1992 VOL. 20 NO. 6



*Season's Greetings from CMOS Council
Joyeuses Fêtes du Conseil SCMO*



The CMOS Executive recently enjoyed a fall meeting in Victoria. At the helm is CMOS President David Krauel, and crewing are, left to right, Sus Tabata (Treasurer), Doug Bancroft (Corresponding Secretary), Humfrey Melling (Recording Secretary), and Gordon McBean (Vice-President). Behind the camera was the Executive Director of CMOS, Uri Schwarz.

EDITOR'S COLUMN

The next issue of the CMOS Newsletter 21(1), February 1993, will go to press on January 20th, 1992. Contributions are welcome and should be sent to me at:-

Institute of Ocean Sciences
P. O. Box 6000
Sidney, B.C. V8L 4B2
Tel. (604)-363-6590
FAX (604)-363-6746

I prefer receiving contributions submitted on floppy disk in a DOS format, however, I can now convert Macintosh files to DOS files. DFO contributors can send ASCII files to me over DFOnet to IOSCCS::HJFREE. Anyone with access to Omnet can send ASCII files to me at IOS.BC, attention Howard Freeland. ASCII files can also be sent to me via Internet to HJFREE@IOS.BC.CA. If you want to send graphics, then HPGL files can be sent as ASCII files over the networks, any other format will have to be sent on paper or on a floppy disc. It is recommended that whatever software prepares an HPGL file be configured for the HP7550 printer. If you have the option of selecting pen colours, please don't.

Do you have an interesting photograph, say, an interesting meteorological or oceanographic phenomenon? If so, write a caption and send me a high contrast black and white version for publication in the CMOS Newsletter. Savonius Rotor is also looking for assistance from anyone who has an unusual point to make.

Howard J. Freeland, CMOS Newsletter Editor

Letter to the President of CMOS

Mr. President:

It is a pleasure for us to address you in order to inform you about the foundation of the Cuban Meteorological Society during a solemn session held in the headquarters of the Cuban Academy of Sciences on January 28, 1992.

The Board of Directors has the enjoyment to invite you, Mr. President, and all members of the Canadian Meteorological and Oceanographic Society to establish deep and fraternal link and cooperation between our Societies and memberships. It is our desire to have the privilege of getting this kind of relation.

The Cuban Meteorological Society, which is legally countersigned by the Associations Law of the Cuban Republic, is an autonomous and non-governmental organization, with its own juridical personality, and affiliates any person with interest in meteorology, professionals or amateurs, Cuban or foreigners, living in or out of the country.

The Cuban Meteorological Society, on behalf of all their associates and through its Board of Directors, and myself, Mr. President, testify the highest consideration to you and the members you represent.

Respectfully,

Dr. José Díaz Arias
President, Sociedad Meteorologica de Cuba
Apartado postal 4279, Código Postal 10400
Ciudad Habana, Habana 4, Cuba

WHAT'S GOING AROUND?

by Savonius Rotor

My readers will be pleased to hear that I have a new computer, I have upgraded from the 286 that I reported on in the last issue to a 486 machine. However, as I read the many volumes of justification for this purchase (as required by DSS) I spent some time researching the actual meaning of words used by manufacturers to describe their new products in product reviews. Here is a brief glossary of computer terminology as used by computer marketing departments:

| | |
|-----------------------------|--|
| NEW | Different colour from previous design |
| ALL NEW | Parts are not interchangeable with those of the previous design. |
| EXCLUSIVE UNMATCHED | Imported product. Almost as good as the competition. |
| DESIGN SIMPLICITY | Manufacturer's cost cut to the bone. |
| FOOL-PROOF OPERATION | No provision for adjustment. |
| ADVANCED DESIGN | Salesman doesn't understand it. |
| ITS HERE AT LAST | We shipped it in only 48 weeks! |
| FIELD TESTED | Factory lacks test equipment. |
| HIGH ACCURACY | Unit on which all parts fit. |
| RUGGED | Too heavy to lift. |
| YEARS OF DEVELOPMENT | Finally got one that worked. |
| REVOLUTIONARY | It's different from our competitor's. |
| BREAKTHROUGH | We finally figured a way to sell it. |
| REVOLUTIONARY | It sits on a turntable. |
| FUTURISTIC | Can't figure any other reason why it looks the way it does. |
| ENERGY SAVING | Achieved when power switch is in the OFF position. |
| NO MAINTENANCE | Impossible to fix. |
| PERFORMANCE PROVEN | Works through the warranty period. |

Innovators in the Schools

Centres are reminded about the Innovators in the Schools network. This federal/provincial initiative is establishing a database of scientists, engineers, technicians, and technologists who teachers can invite into the classroom to talk to young students and turn them on to science, engineering and mathematics. Centres are encouraged to become involved at the local, provincial or national level. Members should also make their local schools aware of the program so that teachers will use the database. Student enrolments in science and technology are dropping below the expected demand. This program is an effective way to attract students into our disciplines and provide Canada with the meteorologists, oceanographers and hydrologists of the future. For more information, please write to The Honourable William C. Winegard, the Minister for Science.

CMOS Strategic Plan

At the Annual General Meeting in Quebec City, the membership directed the Council to prepare a Strategic Plan to provide CMOS with a set of objectives for the next five to ten years.

Council has prepared a draft summary for discussion purposes. This preliminary draft plan has drawn on "a Plan for the Future" adopted by the Royal Meteorological Society. Before Council proceeds further with the Strategic Plan, we want to obtain feedback from the general membership. Are members in agreement with the proposals? Should some items be amended or deleted? Should other issues be addressed? Please provide your input directly to the President - David Krauel at Royal Roads Military College, FMO, Victoria, BC, V0S 1B0. Council hopes to be able to publish a complete draft of the Strategic Plan in the Newsletter early in the new year. Please provide your comments now.

THE CANADIAN METEOROLOGICAL AND OCEANOGRAPHIC SOCIETY DRAFT FOR A STRATEGIC PLAN

Prologue:

The Executive of the Society was asked at the Annual General Meeting held in June 1992 at Quebec City to prepare a strategic plan for the Canadian Meteorological and Oceanographic Society (CMOS). The Executive reviewed the objectives of the Society and considered herein how these might best be attained and what goals could be realistically reached in the future, e.g., the next ten years.

We recognize that CMOS must remain responsive to change and that the Society has an important role to play in establishing standards within the professions, and in providing ways and means to communicate information of interest to scientists and others through meetings, our newsletter and scientific journal, and scholarly, technical and other publications.

Summary

We will promote excellence in all aspects of meteorology and oceanography. We will foster recognition of the importance of operational activities in meteorology and oceanography and of strong supporting activities in research, education and applications.

We advocate an expansion in the membership and an increase in the activities of Centres, Committees and Special Interest Groups. To aid this, we will commit additional assistance to these bodies and will promote their meetings and activities through the Newsletter. We will encourage the active participation of all members in the decisions and evolution of the Society by holding elections, approving policies, amending the Constitution and By-Laws, etc. by mail-in ballot, thus enfranchising all members, not just those able to attend the Annual General Meeting.

We will advance knowledge and enhance interest in meteorology and oceanography by publishing and marketing the journal, Atmosphere-Ocean. Hydrology will also continue to be included in these endeavours. We will promote conferences and meetings to discuss and publicize recent scientific observations and technical developments of import,

and advertise future plans for research in areas of pure and applied meteorology and oceanography through the Newsletter. We will develop the Newsletter into a more substantive publication with expanded news and information reports and articles on operational meteorology and oceanography and climatological topics. We will consolidate the Society's resources into two publications, The Newsletter and Atmosphere-Ocean. We will continue to sponsor tours of CMOS Centres, Canadian universities and government institutions by experts in meteorology and oceanography.

We will arrange for the provision of educational material to, and meetings and courses of value for, teachers and weather broadcasters. The Meteorology and Oceanography Education Committees will aid these endeavours. The Professionalism Committee will promote the standing of professional Meteorologists, Oceanographers and Hydrologists. We will continue to help maintain the status of the meteorological and oceanographic professions through our accreditation and endorsement programs. The Accreditation Committee will continue to provide support to this activity. In addition, these Committees will catalyze the organization of meetings of general meteorological and oceanographic interest to the public of all ages.

We will provide and direct information of use to members, to the public, to government, and to national and international bodies by preparing and publishing advice and comment about meteorological and oceanographic topics of concern to the public, the government and other international scientific bodies. We will stress to governmental and other relevant agencies that environmental policy and regulations must be developed on a strong basis in atmospheric, oceanographic and hydrological science. The Scientific Committee will aid in ensuring the success of these ventures.

We will nurture extant links and develop new bonds to international organizations and national societies of other countries carrying out meteorological and oceanographic studies. We will develop CMOS's role as the internationally recognized representative organization for Canadian meteorology and oceanography. Particularly, we will provide help to developing countries by providing or exchanging our journal, Atmosphere-Ocean.

Timetable for Implementation of the Strategic Plan

1. Membership

AIM

The CMOS membership, which has been fluctuating during the last decade between 800-1000 members should be increased to 1500 with recruitment to concentrate in areas presently not or only sparsely represented such as biological oceanography, operational meteorology, etc.

METHOD

Activating the membership Committee, consisting of a Chairman and one member from each Centre; arrange national and local drives, posters with tear-off cards, etc.

TARGET DATES: 1200 (1996) 1400 (1993) 1500 (2000)

CMOS Strategic Plan (cont.)

AIM

Enfranchisement of all members on important discussions and elections.

METHOD

Constitution currently permits mail ballots for By-Law changes. Minor amendment required to enable election of officers by mail ballot.

TARGET DATE: (1993)

2. Increased Activities by CMOS Bodies

AIM

All CMOS bodies should fulfil their mandates in accordance with the By-Laws and their individual terms of reference. Yearly meetings should be encouraged, as well as meetings of all chairpersons at Congresses to re-review progress and plan activities.

METHOD

A database should be established of all CMOS bodies, to keep track of their composition and ensure regular turnover of officers and members. Next, inactive bodies should be abolished, and the remainder made to report regularly on their activities. The Vice-President should be responsible to monitor these activities, chair the annual meetings of chairpersons at Congresses, and report on progress at Council meetings.

TARGET DATES: database (1992) inactive bodies (1993)

3. Publications

AIM

A larger readership is needed for Atmosphere-Ocean, nationally and internationally.

METHOD

The Director of Publications should undertake a promotional campaign with the help and advice of the University of Toronto Press.

TARGET DATE: (1992/3)

AIM

Consolidation of the Society's publications with the possible renaming of the Newsletter.

METHOD

Consult membership on number, style and names of publications.

TARGET DATE: (1992/3)

4. Policy and Other Statements

AIM

The Society should issue policy and other statements as necessary. It should disseminate these statements via the Newsletter to members and by other means to the public and to government bodies and individuals.

METHOD

The Scientific Committee will consult the membership on the type and content of policy and other statements via the Newsletter and then proceed with their preparation/refining. The Council should set up a Public Awareness Committee charged with the dissemination of these statements.

TARGET DATES: content (1992/3) dissemination (1993)

5. Administration

AIM

The Society should strive to have its own office with a full-time Executive Director and Secretary.

METHOD

Until this is possible, the most cost-effective method to ensure a well administered Society whose Executive changes location every three years should be found. When the Society has a membership of 1500 it may be able to afford its own permanent office.

TARGET DATE: three year location (1993/4) permanent (2000)

Special Interest Groups

At the 26th Annual General Meeting in Quebec earlier this year the following policy was passed. "The activity of Special Interest Groups within CMOS will be reviewed annually by Council. If a Special Interest Group has been inactive for two years (i.e. no annual reports, no meetings, no newsletters, or similar activity) Council will give notice through the Newsletter that the Special Interest Group will be dissolved unless evidence of renewed activity is forthcoming. If, after a period of two months, no members make a commitment to revive the Special Interest Group, Council will dissolve the inactive group at the next council meeting (By-Law 6a)".

It is the intention of the Executive to review the activities of each SIG early next year. We want you to know that the Executive fully supports all of the SIGs and encourages each of them to continue an active program that involves the membership. The above policy arose due to a concern that we would be misleading CMOS members if we indicated that a certain SIG existed and solicited an expression of interest in the SIG on the annual membership application form, while in fact the SIG was inactive and remained inactive for more than two years.

The Agriculture and Forest Meteorology SIG has been inactive for three years and currently does not have a Chair. If anyone is interested in assuming this position or assisting in the reactivation of this SIG, please contact the Executive. The President has recently corresponded with the Chair of each SIG and has encouraged them to communicate recent activities and plans to the Executive. SIGs have also been encouraged to use the Newsletter to communicate with their members.

The Executive would also like to encourage the formation of new SIGs if there is interest. At the last Congress it was suggested that there should be SIGs in Chemical Oceanography, Biological Oceanography and Environmental Sciences. Our By-Laws indicate that a new SIG may be approved by Council upon the receipt of a written request from at least twenty-five members. If there is interest to form a SIG in any of the above specialties or in any others, the Council would welcome a request.

Canadian Disasters An Historical Survey

The CMOS Newsletter for October 1992 included an article by Bob Jones on "Canadian Disasters: An Historical Survey". The newsletter should have included a comment of the form:

This article was first published under the same title in the journal *Natural Hazards* 5: 43-51, 1992, Kluwer Academic Publishers. The article is reprinted with the kind permission of the Publishers and included amendments to bring the tables up-to-date.

CMOS CONGRESS 1993 THEME and SPECIAL SESSIONS (Revised Description)

Four Theme Sessions are being planned for the 1993 Congress in Fredericton (8-11 June), each starting a different morning with one or two Invited (plenary) Speakers. There will also be a number of Special Sessions on topics of particular interest. These will generally include an Invited (non-plenary) Speaker, and will run concurrently with other sessions. Topics, descriptions and Convenors of the Theme and Special Sessions are summarized below. The Call for Papers for these and other sessions at the 27th CMOS Congress may be found elsewhere in this issue of the Newsletter. All abstracts are to be submitted to the Program Committee Chairman with an indication of any session preference. Additional requests or suggestions may be directed to the Chairman or appropriate Convenor. Confirmed Invited Speakers are indicated in the following session descriptions.

THEME SESSIONS:

CLIMATE MODELLING. This session will focus on modelling and understanding climate and climate change. Relevant studies of the atmosphere, hydrosphere, cryosphere, lithosphere and biosphere are all welcome and studies of coupled systems are particularly encouraged. Process studies aimed at understanding an isolated aspect of the system or providing a parameterization for use in larger scale studies are also welcome. Laboratory and observational studies which may provide motivation for, constraints on or direct input to climate modellers are encouraged. Invited Speakers: Dr. John Imbrie, Brown University; Dr. Barry Saltzman, Yale University. (Convenor: Dan Wright, Bedford Institute of Oceanography, 902/426-3147, FAX:902/426-7827)

FOREST AND AGRICULTURAL METEOROLOGY. This session will focus on the transfer of research results to operational problems and practice in agriculture and forestry. Papers are particularly solicited on the development of microcomputer-based decision models using weather or climate data for operational use. Papers on other topics related to the theme are also welcome. Invited Speaker: Dr. Jacques Regniere, Forestry Canada. (Convenor: Bob Dickison, University of New Brunswick, 506/450-8802, FAX:506/450-9397)

PHYSICAL-BIOLOGICAL INTERACTIONS IN THE OCEANS. This session will focus on how the physical environment influences marine organisms and fisheries. Papers describing relationships between the physical environment and the distribution, growth, survival and catchability of marine organisms on spatial scales ranging from individual organisms to populations and on temporal scales of minutes to decades are invited. Papers on other aspects of the session theme are also encouraged. Invited Speaker: Dr. David Mackas, Institute of Ocean Sciences. (Convenor: Fred Page, St. Andrews Biological Station, 506/529-8854, FAX:506/529-4274)

REMOTE SENSING. This session is interested in attracting contributions from a wide range of disciplines. The use of remote sensing techniques in Forestry and Hydrology is one example of the type of contribution sought. There will be several papers on the calibration and validation of ERS-1 data. Meteorologists and oceanographers interested in assimilating satellite or other remotely sensed data into operational and research models are also encouraged to respond. Invited Speaker: Dr. Evert Attema, European Space Agency. (Convenor: Fred Dobson, Bedford Institute of Oceanography, 902/426-3584, FAX:902/426-7827)

SPECIAL SESSIONS:

CANADIAN HAZARDS. The International Decade for Natural Disasters Reduction (IDNDR), proclaimed by the United Nations, started in January 1990 and will run through the decade. As a part of the Canadian contributions to this decade, CMOS plans to hold an IDNDR panel discussion every third year during the annual CMOS Congress, starting with the 1993 Congress. After a set of invited talks, the panel moderator will open the floor for discussion with the audience addressing questions to the panel members. Invited Speaker: Dr. Kate Kranck, Bedford Institute of Oceanography. (Convenor: Tad Murty, Institute of Ocean Sciences, 604/363-6311, FAX:604/363-6746)

CASP II. The Canadian Atlantic Storms Program II conducted an extensive field study of storms over Newfoundland and the surrounding ocean in January-March 1992, and of their influences on ocean conditions and sea ice. This session will present results from the ground-based, airborne and shipborne measurements during the study. It will include case studies of a series of several marine cyclones. Invited Speaker: Dr. Colin Banfield, Memorial University of Newfoundland. (Convenor: Owen Hertzman, Dalhousie University, 902/494-3683, FAX:902/494-3877)

THE HYDROLOGICAL CYCLE ON REGIONAL AND GLOBAL SCALES. The importance of the hydrological cycle in the Earth's climate system is being increasingly recognized by atmospheric scientists and oceanographers. This new emphasis has led to large field experiments and modelling initiatives dealing with land surface climate processes and large-scale hydrology. This session is intended to promote discussion among hydrologists, meteorologists and oceanographers interested in the interactions of regional and global scale hydrological systems with the atmosphere and oceans. Contributions are solicited on process, observational and modelling studies of the hydrological cycle and its

components. (Convenor: Rick Lawford, National Hydrology Research Centre, 306/975-5775; FAX:306/975-5143)

MODERNIZING CANADA'S WEATHER SERVICES. The business of weather services in Canada is undergoing modernization at an unprecedented rate. The Atmospheric Environment Service is committed to implementing an ambitious strategic plan while its expanding its role in environmental issues under the Green Plan. Many of the meteorologist's traditional activities are being automated and computerized, both inside and outside of government. This session will focus on some of the recent and upcoming changes in Canada's weather services. Invited Speaker: Mr. John Mills, Atmospheric Environment Service. (Convenor: Ken Macdonald, Maritimes Weather Centre, 902/426-9200, FAX:902/426-4873)

OCEANOGRAPHY OF SEAMOUNTS AND BANKS. The interactions of ocean currents with the steep topography associated with large seamounts and fishing banks are believed to generate closed circulation patterns, large amplitude internal waves and intense turbulence that can dominate the biological response. This session will focus on recent experiments designed to explore the physical and biological response to oceanic flow associated with steep topography. Invited Speaker: Dr. Ken Brink, Woods Hole Oceanographic Institution. (Convenor: Howard Freeland, Institute of Ocean Sciences, 604/363-6590, FAX:604/363-6746)

OZONE AND THE ULTRAVIOLET. The session will deal with all aspects of atmospheric ozone and ultraviolet radiation. Of particular interest will be measurements and modelling of stratospheric and tropospheric ozone and ultraviolet-B radiation. The session should be timely keeping in mind that the AES monitoring and reporting program for UV-B will have been in effect for one year. (Convenor: Wayne Evans, Trent University, 705/748-1622, FAX:705/748-1569)

TRACERS IN THE OCEAN. This session will include papers that use tracers to help determine the origin and circulation of water masses and their ages. Papers dealing with rates of reactions or transport of materials are invited. Papers on transient tracers are especially welcome. Invited Speaker: Dr. Doug Wallace, Brookhaven National Laboratory. (Convenor: Peter Jones, Bedford Institute of Oceanography, 902/426-3869, FAX:902/426-7827)

WOCE: OCEAN CIRCULATION OBSERVATIONS AND MODELS. This session will follow the Theme Session on climate modelling, and will focus on aspects of ocean circulation relevant to climate. Results from projects or observations related to the World Ocean Circulation Experiment are particularly welcome, as are process studies of relevant aspects of ocean circulation. Computer, laboratory or theoretical models, as well as observational studies and interpretations are encouraged. (Convenor: Barry Ruddick, Dalhousie University, 902/494-2505, FAX:902/494-3877)

Official CMOS Postcards

Many CMOS members invest some part of their time in visiting schools to give talks on current issues in meteorology and oceanography. It has been suggested to the Executive that colour postcards should be printed. These postcards would be sold in bulk to members or their institutions at a nominal cost and used to advertise our science. Ideally we would print six sets of cards each carrying a picture of scientific interest on one side and an explanation on the reverse. Three would carry meteorological themes and three oceanographic themes. The pictures could be photos with dramatic content (tornados, water spouts etc.) or interpreted data carrying an important message (e.g. a series of satellite pictures showing the development of an ozone hole). We are looking for ideas, and we are willing to get postcards printed, in colour, and arrange for their distribution. We imagine that after one of our members gives a talk at, for example, the Sesame Street Middle School then he or she will hand out postcards to the excited class.

At the present time we are looking for some feedback. Let us know if you think this is a good idea or a bad idea. let us know if you have a brilliant idea for a picture, and text to go with it (say, 50 words). If you do propose an idea, please be prepared to put in the effort required to assemble the idea into a master copy that can be used for printing purposes.

Please send comments to either:

| | |
|----------------------------|-------------------------|
| Doug Bancroft | Howard Freeland |
| SSO Meteorol. & Oceanog. | Inst. of Ocean Sciences |
| Maritime Forces Pacific HQ | P. O. Box 6000 |
| FMO Victoria | Sidney, B.C. V8L 4B2 |
| B.C. V0S 1B0 | Tel. (604)-363-6590 |
| Tel. (604)-363-2958 | Fax. (604)-363-6746 |
| Fax. (604)-363-2132 | EMail HJFREE@IOS.BC.CA |

Call for Papers

**Wind and Wind-Related Damage to Trees
18-23 July 1993 Heriot Watt University
Edinburgh, Scotland**

The conference on Wind and Wind-Related Damage to Trees will address six topic areas: Airflow and Topography; Forest Airflow; Biomechanics; Tree Physiological Responses; Ecological Studies and Risk Assessment; and Management Response.

Anyone interested in submitting either a paper or a poster should send an abstract of no more than 250 words to C.P. Quine, Forestry Commission, Northern Research Station, Roslin, Midlothian, Scotland, UK, EH25 9SY (Telephone 44 31 224 2176, Fax 44 31 445 5124). Your abstract may be submitted typewritten or on a Dos compatible disk in Word, Word Perfect or ASCII format. The abstract should include a title, author and address. The deadline for receipt of abstracts is 30th November 1992. Completed manuscripts of accepted papers will be required one month prior to the conference. Proceedings will be published following independent review, probably in book form.

Further details may be obtained from the Chairman of the Organising Committee, C.P. Quine (address as above).

News from CMOS

The CMOS Council held its autumn session in Vancouver, B.C. at the University of British Columbia and dealt with a large number of issues.

The financial situation of the Society was reviewed and found on the whole satisfactory, although slightly lower than average membership figures have resulted in decreased income from that source. The President has written to Centres to request assistance in getting former members to re-join.

Council approved two guidelines with financial implications: travel on CMOS business to be approved by the Executive in each case and generally to follow federal government practices; conference registration costs not to be included under that heading. Student travel grants for Congress attendance (generally for student members presenting papers) have been fixed to a maximum individual assistance of \$500.

Special Interest Groups (SIGs) have been urged to provide information on their activities in the light of the 1992 AGM decision about inactive SIGs.

Morley Thomas, the CMOS Archivist, has agreed to prepare, with the help of a number of long-time members, a history of the Society. Anyone with interesting material, pictures, etc. is invited to provide them to him via the CMOS Business Office.

CMOS will approach the Minister of Fisheries and Oceans on the looming crisis in vessel support in Canada for Canadian and international oceanographic programmes; a similar letter was written to CNC/SCOR.

The Scientific Committee reported that it was working on a CMOS statement on natural hazards. It is expected that a draft statement on this subject will appear in the next Newsletter.

At the invitation of the Atmospheric Environment Service, Council has agreed that CMOS would host the third International Conference on School and Popular Meteorological and Oceanographic Education, to be held in Toronto on July 14-18, 1993. The previous two conferences, which were directed mainly at teachers, were hosted by the Royal Meteorological Society and the American Meteorological Society, respectively. A local arrangements committee set up by the Toronto Centre was approved (Chairperson, Ms. Sheila Bourque).

Preparations for the 1993 Congress (Fredericton, N.B.) are going well, and those for the 1994 Congress (Ottawa, Ont.) have started. Chairs for the Ottawa Local Arrangements Committee and the Program Committee (Mike Hawkes and Geoff Holland) were approved. A recommendation for the site of the 1995 Congress will be made at the February Council meeting for approval by the 1993 AGM.

Nouvelles de la SCMO

Le Conseil de la SCMO a tenu sa session automnale à Vancouver, C.B. et a discuté lors de cette réunion d'un grand nombre de questions.

La situation financière de la Société a été révisée et d'une façon générale fut trouvée satisfaisante quoiqu'un nombre de membres inférieur à la moyenne habituelle ait provoqué des revenus plus bas. Le Président a écrit aux différents Centres leur demandant assistance pour recruter de nouveau les anciens membres.

Le Conseil a approuvé deux lignes directrices qui ont des implications financières: les voyages effectués pour la SCMO doivent être approuvés par l'Exécutif et doivent généralement suivre les directives du gouvernement fédéral; les coûts d'enregistrement à des conférences ne sont pas inclus sous cette rubrique. Les subventions pour les voyages d'étudiants au Congrès (habituellement pour des étudiants faisant une présentation) ont été fixées à un maximum de 500 \$ par étudiant.

Les groupes d'intérêts spéciaux sont priés de faire parvenir l'information requise sur leurs activités à la lumière de la décision prise par l'Assemblée générale de 1992 à propos des groupes inactifs.

Morley Thomas, l'archiviste de la SCMO, a consenti à préparer avec l'aide d'autres anciens membres de la SCMO l'historique de la Société. Toutes les personnes qui détiendraient du matériel pouvant être utile, des photographies ou autres, sont priées de les lui faire parvenir par l'entremise de notre bureau d'affaires.

La SCMO pressentira le Ministre de Pêches et océans sur la crise imminente à propos du support des navires au Canada pour les programmes canadiens et internationaux d'océanographie. Une lettre similaire a été envoyée au Conseil national canadien / Comité scientifique pour les sciences océanographiques.

Le comité scientifique a mentionné qu'il travaillait présentement à la rédaction d'un énoncé sur les désastres naturels. On espère présenter une ébauche de cet énoncé sur ce sujet en particulier dans le prochain numéro de "Nouvelles".

A l'invitation du Service de l'environnement atmosphérique, le Conseil a approuvé que la Société soit l'hôte de la troisième Conférence internationale portant sur l'enseignement et l'éducation populaire de la météorologie et de l'océanographie qui doit avoir lieu à Toronto du 14 au 18 juillet 1993. Les deux premières conférences qui s'adressaient principalement aux professeurs ont été tenues respectivement par la "Royal Meteorological Society" et "l'American Meteorological Society". Le comité local pour les arrangements, mis en place par le Centre de Toronto, a été approuvé par le Conseil (Présidente: Ms. Sheila Bourque).

Les préparatifs pour le Congrès de 1993 (Frédéricton, N.B.) vont bon train. Ceux pour le Congrès de 1994 à Ottawa, Ont., ont également débuté. Les présidents pour le comité local des arrangements et le comité du programme (Mike Hawkes et Geoff Holland) ont été approuvés par le Conseil. Une recommandation pour le site du congrès de 1995 sera faite à la réunion de février du Conseil pour approbation ultérieure par l'Assemblée générale en 1993.

CMOS Prizes and Awards

Atmospheric Environment Service
4999-98 Avenue, 2nd Floor
Edmonton
Alberta T6B 2X3

27 October 1992

The Canadian Meteorological and Oceanographic Society established the Prizes and Awards Committee to focus attention on the achievements of its members and their influence on the sciences of meteorology and oceanography in Canada.

Nominations are now being solicited for the various award and prize categories in our society. Your involvement in identifying and nominating appropriate individuals is a significant aspect of your contribution to our Society.

The awards program is important to CMOS as it brings credit and recognition to those who deserve it. Outstanding achievers in the sciences of oceanography or meteorology, or in the field of radio or television presentation of meteorological forecasts should be known and recognized by their CMOS peers as well as by members of the Canadian community. Both media and Society attention is focused on the recipients, thereby highlighting important work and Canadian contributions to specific science programs.

A list of the various awards is attached. Please note the approved and necessary criteria for each award or prize. It is essential that your written recommendation for a particular award be supported by complete documentation, illustrating that the candidate has met all the category's requirements.

The deadline for receipt of all nomination and documentation packages is Monday 1st February 1993. Please send all packages to the undersigned (Tel. 403-468-7902) at the above address. Nominations may be submitted by mail, or, if of a reasonable length by fax (403)-468-7950.

Thank you for your participation,

Neil Meadows
Secretary, CMOS Prizes and Awards Committee

Prix et Bourses de la SCMO

Service de l'environnement atmosphérique
4999-98 Avenue, 2^{ème} étage
Edmonton
Alberta, T6B 2X3

le 27 octobre 1992

La Société Canadienne de Météorologie et d'Océanographie (SCMO) a réuni un comité qui a pour mandat de décerner des prix et bourses aux membres qui ont apporté une contribution importante dans les domaines de la météorologie et de l'océanographie au Canada.

Les personnes ayant contribué d'une façon significative aux domaines de la météorologie et de l'océanographie, ou encore dans la diffusion des prévisions météorologiques à la radio ou à la télévision doivent être connus et reconnus par les membres de la SCMO ainsi que par la population canadienne. Ce programme de prix et bourses est important pour la SCMO car il a pour but de mettre ses membres en évidence et de les récompenser. Il permet aussi de mieux faire connaître les récipiendaires et leurs contributions dans les programmes scientifiques canadiens.

Nous procédons présentement à la mise en candidature dans les diverses catégories de prix et de bourses. Nous demandons aux membres de collaborer à cette mise en candidature en proposant des candidats.

Vous trouverez ci-joint une liste des divers prix et bourses. Veuillez porter attention aux critères établis, approuvés et requis pour chacun. Il est essentiel que chaque proposition soit appuyée d'une documentation complète montrant l'éligibilité du candidat.

La date limite pour recevoir les candidatures, ainsi que la documentation, est le lundi 1^{er} février 1993. Veuillez envoyer vos propositions ainsi que la documentation montrant l'éligibilité de vos candidats au soussigné à l'adresse suivante (tél. 403-468-7902). La documentation peut être envoyée par la poste ou par télécopieur (403-468-7950).

Merci de votre participation.

Neil Meadows
Secrétaire, Comité des prix et bourses de la SCMO

Prizes and Awards Criteria

The criteria listed below are extracted from Appendix I of the Society's bylaws.

1. The deadline for submissions is rigidly observed due to other Committee deadlines and the high volume of copying required. Complete submissions must be in the hands of the Secretary by that date.

Allow sufficient time for mail or courier. Some couriers may not offer overnight service to Edmonton from all regions of Canada. Also, first class mail from Halifax (for example), still on occasion may take several days to reach Edmonton. If desired, submissions may be faxed to the Secretary of the Prizes and Awards Committee. Please contact the Secretary for the current phone number.

Critères d'éligibilité.

Les critères d'éligibilité énumérés ci-dessous originent de l'appendice I des règles établies par la société.

1. La date limite doit être respectée étant donné les échéances des autres comités ainsi que la grande quantité de photocopies requises. Les candidatures doivent être entre les mains du secrétaire avant la date limite.

Il faut allouer suffisamment de temps pour le transport du courrier. Certaines compagnies de courrier n'offrent pas de service de nuit à Edmonton pour toutes les régions du Canada. Aussi par exemple, le service postal de première classe venant de Halifax peut mettre plusieurs jours pour arriver à Edmonton. Si vous le désirez, le secrétaire du comité des prix et bourses peut recevoir des fac-similés. Vous pouvez obtenir le numéro de téléphone pour envoyer un fac-similé en communiquant avec ce dernier.

CMOS Prizes and Awards (cont.)

2. Some prize categories specify that a nominee must be a member of CMOS. Nominees in these categories who are not members of CMOS on the date which nominations close will be disqualified and their nominations will not be considered. Membership status will be confirmed by phone through the office of the Executive Director of CMOS.

3. Receipt of submissions by the Secretary will not be acknowledged unless requested. Acknowledgement when requested, will be by telephone or fax.

4. The current title, full address and phone number of the nominee MUST accompany the submission.

5. Nominees from previous years, who have not received awards may be re-nominated. All criteria provided above apply to re-nominations. All re-nominations must be complete with justification since nomination material is not retained from year to year.

a) PRESIDENT'S PRIZE

May be awarded each year to one or members for a recent paper, book or contribution of special merit in the field of either meteorology or oceanography. Nominees **MUST** be members of the Society. The paper or work;

1. **MUST** have been accepted for publication in Atmosphere-Ocean, Climate Bulletin or another refereed journal, or;

2. **MUST** have been presented to the Society membership at a national or local meeting.

b) THE J. P. TULLY MEDAL IN OCEANOGRAPHY

May be awarded each year to a person whose scientific contributions have had a significant impact on Canadian Oceanography.

c) THE DR. ANDREW THOMSON PRIZE IN APPLIED METEOROLOGY

May be awarded each year to a member or members of CMOS for an outstanding contribution to the application of meteorology in Canada. Nominees **MUST** be members of the Society.

d) PRIZE IN APPLIED OCEANOGRAPHY

May be awarded each year for a significant contribution to the application of oceanography in Canada. Nominees **MUST** be members of the Society.

e) THE RUBE HORNSTEIN PRIZE IN OPERATIONAL METEOROLOGY

May be awarded each year to an individual for providing outstanding operational meteorological service in its broadest sense, but excluding the publication of research papers as a factor, unless that research is already incorporated as an aid in the day-to-day performance of operational duties. The work for which the prize is granted may be cumulative over a period of years or may be a single notable achievement.

f) GRADUATE STUDENT PRIZES

One or more prizes may be awarded in this category each year for contributions of special merit in the fields of meteorology or oceanography by graduate students. Such students must be;

Prix et Bourses de la SCMO (cont.)

2. Certaines catégories de prix sont réservées aux membres de la SCMO. Les candidats de ces catégories qui ne sont pas membres lors de l'échéance des nominations seront disqualifiés. Le statut de membre des candidats sera confirmé par le bureau de la direction de la SCMO par téléphone.

3. La réception des candidatures par le secrétaire ne sera pas confirmée par un avis de réception, sauf si vous le demandez. Dans ce cas la confirmation sera faite par téléphone ou par télécopieur.

4. Le titre actuel de chaque candidat, son adresse complète, ainsi que son numéro de téléphone doivent être envoyés avec la mise en candidature.

5. Les candidats des années précédentes, qui n'ont pas reçu de prix, peuvent être reconsidérés comme candidats. Ces derniers doivent suivre les mêmes critères cités ci-haut. Les informations relatives au candidat doivent être complètes, puisque les documents de l'année précédente ne sont pas conservés.

a) PRIX DU PRESIDENT

Peut être décerné à un ou plusieurs membres pour une publication récente, un livre ou une contribution importante dans les domaines de la météorologie ou de l'océanographie. Les candidats doivent être membres de la SCMO. L'article ou la contribution;

1. doit avoir été accepté pour être publié dans Atmosphère-Océan, Bulletin de Climatologie ou un autre journal arbitré, ou;

2. doit avoir été présenté aux membres de la société lors d'une assemblée nationale ou locale.

b) MEDAILLE J. P. TULLY EN OCEANOGRAPHIE

Peut être décernée chaque année à une personne dont les contributions scientifiques ont eu un impact significatif en océanographie au Canada.

c) PRIX DR. ANDREW THOMSON EN METEOROLOGIE APPLIQUEE

Peut être décerné chaque année pour une contribution remarquable en météorologie appliquée au Canada. Le récipiendaire doit être membre de la société.

d) PRIX EN OCEANOGRAPHIE APPLIQUEE

Peut être décerné chaque année pour une contribution significative en océanographie appliquée au Canada. Le récipiendaire doit être membre de la Société.

e) PRIX RUBE HORNSTEIN EN METEOROLOGIE OPERATIONNELLE

Peut être décerné chaque année à une personne ayant procuré un service exceptionnel en météorologie dans son sens le plus large. Par contre la publication des articles de recherche sera exclue, à moins que cette recherche soit déjà incorporée comme aide quotidienne dans le travail opérationnel. Le travail pour lequel le prix est accordé peut être cumulatif sur une période de plusieurs années, ou peut être un seul accomplissement remarquable.

f) PRIX ETUDIANT GRADUE

Un ou plusieurs prix peuvent être décernés chaque année aux étudiants gradués ayant apporté une contribution notable en météorologie et/ou en océanographie. Le ou les étudiants doivent être;

CMOS Prizes and Awards (cont.)

1. registered in oceanography or meteorology at a recognised Canadian University, or;
2. Canadian graduate students registered at a recognised foreign university in meteorology and/or oceanography programs.

g) ENVIRONMENTAL CITATION

One or more citations may be awarded each year to individuals or groups who have in the previous year, made some outstanding contribution in helping to alleviate pollution problems, in promoting environmental improvements, or in developing environmental ethics.

h) CITATION FOR OUTSTANDING RADIO AND TELEVISION WEATHER PRESENTATION

May be awarded each year to a regular on-going Canadian weather program or regularly appearing weather presentation personality. Audio tapes of three consecutive radio broadcasts or VCR recordings (VHS format) of three consecutive telecasts are required, along with the date and time of the programs, the name of the presenter, station, city, etc.

Tapes need not be accompanied by written justifications, but justifications would assist the Committee. Submissions may be made by either Centres or individual members.

Submissions should be based on informative and educational value, effective communication of material, appeal to the public, a high level of technical and professional presentation, etc.

i) REVIEWERS OF THE YEAR; METEOROLOGY AND OCEANOGRAPHY

May be awarded each year in each category. A recommendation in each category may be made by the senior editor of Atmosphere-Ocean and will be forwarded by the deadline to the Secretary of the Prizes and Awards Committee for inclusion in the committee's annual awards recommendation to Council.

Prix et Bourses de la SCMO (cont.)

1. inscrits dans un programme de météorologie ou d'océanographie d'une université canadienne reconnue, ou;
2. doivent être canadiens inscrits dans un programme d'océanographie d'une université étrangère reconnue.

g) CITATIONS ENVIRONNEMENTALES

Un ou plusieurs prix peuvent être attribués à des individus ou groupes ayant, durant l'année précédente, apporté une contribution importante au problème de la pollution, ou ayant favorisé une meilleure qualité ou éthique environnementale.

h) CITATION POUR L'EXCELLENCE EN PRESENTATION DES PREVISIONS METEOROLOGIQUES A LA RADIO OU A LA TELEVISION

Seules les productions canadiennes sont éligibles. N'importe quelle série régulière de diffusion météorologique peut être considérée. Une bande audio de trois émissions radiophoniques consécutives ou un enregistrement VHS de trois émissions télévisées est requis. La date, le temps des émissions, le nom du présentateur, la station, la ville, etc, peuvent être accompagnés d'une justification écrite pour aider le comité de sélection.

Les extraits soumis doivent l'être sur la base d'émissions d'informations et/ou de valeurs éducatives, attrayantes pour le public et avec un haut niveau de présentation technique et professionnelle, etc.

i) CRITIQUE DE L'ANNEE; METEOROLOGIE ET OCEANOGRAPHIE

La mise en candidature pour chacune des catégories sera normalement faite chaque année par les éditeurs de Atmosphère-Océan. Une recommandation dans chaque catégorie sera faite par l'éditeur en chef de Atmosphère-Océan et sera envoyée au comité des prix et bourses pour être incluse parmi leurs recommandations annuelles au conseil.

Note: le masculin a été utilisé dans le seul but d'alléger le texte.

GLOBAL WARMING A Call for International Coordination

4th International Conference on the Scientific
and Policy Issues Facing all Governments
April 5th-8th, Chicago, Ill., U.S.A.

SUPCON International and the World Resource Review will convene the 4th Annual International Conference GLOBAL WARMING - A Call for International Coordination. to be held April 5-8, 1993 in Chicago, USA. The objective of the conference is to report on the impacts of the UNCED convention in Rio and provide an international forum on scientific and policy issues facing governments with regard to the greenhouse effect and similar trans-national environmental problems including water shortage, floods, and acid rain. Participating agencies include the U.S. Forest Service, USDA, NASA, EPA, DOE, EPRI, TVA, GRI, environmental ministries, energy ministries, education ministries, forestry and agricultural ministries and meteorological authorities from five continents. Natural resource specialists, energy specialists, atmospheric

scientists, policy analysts, environmental specialists, biotechnologists, and energy, environmental and education officials from around the world participate at this interdisciplinary conference. Papers and panel discussions are invited under a variety of subject headings.

Send 400-word abstracts as soon as possible to the program Committee, Global Warming International Conference, P.O. Box 5275, Woodridge IL 60517-0275, USA.

Tel: 708-910-1551 Fax: 708-910-1561.

Presentation space is limited.

Abstract deadline: November 16, 1992 (Postmark)

Paper deadline: February 15, 1993

Advanced registration: February 18, 1993

Registration deadline: March 31, 1993.

For further information regarding the Global Warming Science and Policy International Conference, and global warming publications contact:

The Global Warming International Center
P. O. Box 5275
Woodridge, IL 60517-0275, U.S.A.

CALL FOR PAPERS

27th ANNUAL CMOS CONGRESS

The 27th Annual Congress of the Canadian Meteorological and Oceanographic Society will be held at the University of New Brunswick, Fredericton, N.B., Canada from June 8-11, 1993.

The Congress will feature Theme Sessions on:

- Forest and Agricultural Meteorology;
- Physical-Biological Interactions in the Ocean;
- Climate Modelling; and
- Remote Sensing.

Special Sessions are also being planned on Canadian Hazards, CASP II, The Hydrological Cycle on Regional and Global Scales, Modernizing Canada's Weather Services, Oceanography of Seamounts and Banks, Ozone and the Ultraviolet, Tracers in the Ocean, and WOCE. In addition, there will be sessions based on contributed papers in other areas of meteorology and oceanography.

Oral and poster papers, and commercial exhibits are invited. Abstracts of papers should be submitted to the Chairman of the Scientific Program Committee by 29 January 1993. Authors are requested to submit both a hard copy and a diskette copy, preferably in Word Perfect 5.1 (or 5.0) IBM format (otherwise ASCII file format). Authors are also requested to indicate any session preference and special audio-visual requirements.

INVITATION A PRESENTER DES COMMUNICATIONS

27ième CONGRES ANNUEL DE LA SCMO

Le 27ième Congrès annuel de la Société Canadienne de Météorologie et d'Océanographie se tiendra à l'Université du Nouveau-Brunswick, Frédéricton, N.-B., Canada, du 8 au 11 juin 1993.

Le Congrès présentera des sessions thématiques portant sur les sujets suivants:

- Météorologie forestière et agricole;
- Interactions physiques-biologiques dans l'océan;
- Modélisation climatique; et
- Télédétection.

Sont également prévues des sessions spéciales portant sur les phénomènes dangereux au Canada, le PCETA II, le cycle hydrologique à l'échelle régionale et globale, la modernisation des services météorologiques canadiens, océanographie des monts sous-marin et des bancs, l'ozone et les rayons UV, les traceurs dans l'océan, et ECOM. De plus, des sessions sur divers autres domaines de la météorologie and de l'océanographie seront organisées.

On vous invite aussi à présenter des communications orales et des sessions d'affichage ou des exposants commerciaux. Les résumés des documents devraient parvenir au président du Comité du programme scientifique avant le 29 janvier 1993. On demande aux auteurs de soumettre une copie papier et une autre sur disquette (si possible, WordPerfect 5.0 ou 5.1 IBM, sinon fichier ASCII). Les auteurs devront aussi indiquer leur préférence quant à la session et leurs besoins en équipement audio-visuel spécial.

For further information, contact: /Pour plus d'information, contacter:

Mr. Dave Daugharty, Chairman
Local Arrangements Committee
Department of Forestry Resources
University of New Brunswick
Fredericton, N.B. E3B 6C2
506/453-4501; 506/453-3538 (FAX)
INTERNET: daug@jupiter.csd.unb.ca

Dr. John Loder, Chairman
Scientific Program Committee
Bedford Institute of Oceanography
P.O. Box 1006
Dartmouth, N.S. B2Y 4A2
902/426-4960; 902/426-7827 (FAX)
INTERNET: jloder@sable.bio.dfo.ca

Editor's Note:

The following is the first in a new series of columns that will highlight Canada's contributions to GEWEX, the Global Energy and Water Cycles Experiment. Contributions to this column will be coordinated by Terry W. Krauss of the GEWEX Secretariat, Saskatoon.

International GEWEX Objectives

The Global Energy and Water Cycle Experiment (GEWEX) is one of the major activities of the World Climate Research Program which is sponsored by the World Meteorological Organization and the International Council for Scientific Unions. GEWEX incorporates in a single, coordinated program, all relevant aspects of climate science from model development and data assimilation to the deployment and operation of pertinent observing systems.

The four scientific objectives of the International GEWEX program are:

- To determine the hydrological cycle and energy fluxes by means of global measurements of observable atmospheric and surface properties;
- To model the global hydrological cycle and its impacts in the atmosphere, the ocean, and on land surfaces;
- To develop the ability to predict the variations of global and regional hydrological processes and water resources, and their response to environmental change;
- To foster the development of observing techniques, data management and assimilation systems suitable for operational application to long-range forecasts, hydrology, and climate predictions.

A major goal of GEWEX is to improve the ability to model global precipitation and evaporation and to provide an accurate assessment of the response of the hydrological cycle and water resources, to climatic change.

The GEWEX Continental-scale International Project (GCIP), as the first major new project under GEWEX, will study the water and energy budgets of the Mississippi River basin. One of the principal scientific objectives for GCIP is to develop and validate macroscale hydrological models, related high resolution atmospheric models, and coupled hydrological/atmospheric models.

Canada's Contribution to GEWEX

The objectives of the Canadian GEWEX Program are:

- To contribute to the international GEWEX Program in areas of special Canadian interest and expertise, and
- To contribute towards the better understanding and prediction of changes to Canada's water resources arising from climatic change.

A goal of the Canadian GEWEX program is:

- To develop the ability to model the water and energy balances of the Canadian Arctic Basin on spatial scales of 100 km and temporal scales of one month.

Activities within Canada are within the purview of the Canadian Climate Program and the Canadian Global Change Program. It is proposed that the Canadian GEWEX Program include the following components:

- Large-scale hydrological and related atmospheric and land-atmosphere studies, linked to GCIP, to be conducted during GEWEX Phase I (1992-97) to be called the Mackenzie GEWEX Study (MAGS);
- Process studies and regional energy and water budget analyses directly or indirectly linked to GCIP and GEWEX objectives;
- Contributions by the hydrological and hydro-meteorological aspects of BOREAS and CRYSYS;
- Participation in experiments related to improved understanding and modelling of cloud-precipitation-radiation processes for climate models, as contributions to the GEWEX Multi-region Cloud System Study (GMCSS);
- Continued global climate model development and contributions to international projects related to GEWEX, including the International Satellite Cloud Climatology Project (ISCCP), the Global Precipitation Climatology Project (GPCP) and others; and
- Planning for and participation in the Global Observing Experiment of GEWEX (1998+).

Canadian GEWEX Planning Meeting and University Workshop

A joint GEWEX Management and Science Committee meeting took place at AES Headquarters on October 14 and 15, followed by a two day workshop to discuss the implementation plan of the Canadian GEWEX program with the University Community.

The purpose of the implementation plan is to outline the areas of special Canadian interest and expertise as they relate to the main GEWEX research activities, their interactions, and the generally expected outputs. The plan should be a useful guide to focus the activities of prospective researchers and foster a greater degree of collaborative effort. Collaboration is a key ingredient of a successful GEWEX project.

Key gaps in our present knowledge of high latitude and cold-region physical processes and our ability to model them were identified and discussed. Conceptual projects addressing physical processes and modelling of the atmospheric and hydrologic processes and their linkages to climatic models were also discussed. Approximately 40 people, including more than 20 university researchers from eleven universities in five provinces attended the GEWEX

GEWEX News (cont.)

Planning Workshop. Three working groups covering atmospheric processes, hydrologic processes, and hydrologic modelling were formed. The three groups discussed and presented plans to be incorporated into the Canadian GEWEX Implementation Plan.

To achieve the goals, the implementation strategy will be to concentrate efforts on the scientific questions associated with critical hydrological phenomena and processes including (but not limited to): snowmelt runoff, snowpack metamorphosis, snowfall measurements, runoff under ice conditions, lake effects, evapotranspiration, and northern wetlands processes. Atmospheric phenomena and processes to be researched include: clouds and radiation, precipitation and moisture and energy fluxes. Activities will concentrate on data assimilation, land-surface parameterizations, and model evaluation, scaling, transferability and coupling with GCMs.

In early December, there will be a Call for Proposals from the Management Committee for research related to the Canadian GEWEX. The GEWEX Science Committee will oversee the process of evaluation and selection of proposals for government-funded projects and the development of an application for an NSERC Collaborative Special Project Grant.

The GEWEX Management and Science Committees wish to thank Ms. Barb Conway from NSERC for her presentation about the Collaborative Special Project Grant program and acknowledges the Canadian Global Change Program for providing some travel funds for university participants.

Head of Canadian GEWEX Secretariat appointed

On October 1, 1992, Dr. Terry Krauss was appointed as Head of the Canadian GEWEX Secretariat. Located at the National Hydrology Research Centre in Saskatoon, Dr. Krauss, reports jointly to the Chiefs of the Hydrometeorological Processes Division of the Climate Research Branch and the Hydrological Sciences Division of the National Hydrology Research Institute of Environment Canada.

Dr. Krauss, a native of Medicine Hat, Alberta, has an M.Sc in meteorology from the University of Alberta, a Ph.D. in the atmospheric sciences from the University of Wyoming, and more than 15 years of experience in conducting both domestic and international atmospheric research and field programs. Before joining Environment Canada, he worked with the Alberta Research Council, the South African Weather Bureau, and INTERA Technologies Ltd.

In his secretariat role Dr. Krauss will coordinate the implementation of Canada's contribution to the international GEWEX program including organizing scientific and planning meetings, informing the national and international science communities on the status of Canadian GEWEX activities, and coordinating the collection and dissemination of data from Canadian and relevant international GEWEX projects. For more information about GEWEX, Terry can be reached at Tel. (306) 975-5776 or Fax. (306) 975-5143.

Weather Wits Computerized Version Now Available (Just in time for Christmas!)

Thanks to the efforts of Ken Jones of the Saskatchewan CMOS Centre Weather Wits, the weather forecasting board game invented and produced by Rick Lawford in the early 1970s, has been updated and developed as a computer game. Ken has customized the game for IBM and IBM-compatible pcs. After spending many hours developing graphic presentations he has succeeded in making the game more "user friendly" and playable. The basic approach to weather forecasting is still the same. Players are assigned to forecast offices where they use information on initial weather conditions to forecast the effects of weather on human activities and the environment during the forecast period. In preparing their forecasts, "forecasters" must assimilate information on air temperature, air pressure, humidity, wind and sky conditions as well as use a tephigram to assess atmospheric stability.

Ken's efforts in preparing the game in computer format were complemented by the initiative of Fraser Hunter who hired a summer student, Mark Cote, to prepare a small instruction booklet to accompany Weather Wits. The booklet describes how to load and play the game as well as giving an introduction to the significance of various meteorological parameters and a glossary explaining many of the terms used in meteorology.

A limited supply of the computer version of Weather Wits has been produced in English and the Saskatchewan CMOS Centre is now offering them for sale. For \$12.50 you can receive a copy of the booklet and a 3 1/2 inch diskette containing the game. Although this version of the game only has CGA graphics it still makes an excellent gift for young people. Any profits will go to the National Executive and Saskatchewan CMOS Centre which financed the production of the present supply of games. Orders should be sent to:

Mr. Ken Jones
Scientific Services Division
Atmospheric Environment Service
Operations Building
Box 4800
Regina, Sask. S4P 3Y4

Royal Meteorological Society Calendar

The 1993 meteorological calendar is now ready for distribution. As last year, the photographs are stunning. The calendars cost £4.10 each or £18.00 for five, including postage and handling. They may be obtained by writing to the R.M.S. at:

Royal Meteorological Society
104 Oxford Road
Reading, Berkshire, RG1 7LJ
England

CLIMATE RESEARCH NEWS

Please send climate research-related material to Ross Brown, Canadian Climate Centre, Phone: (613) 996-4488, Fax: (613) 943-1539.

Workshop on Ocean-Atmosphere Interactions and Process Studies related to Climate Variability and Prediction.
Bedford Institute of Oceanography, Dartmouth, N.S.,
September 3, 1992.

Background:

The workshop was held to discuss climate research activities in the Halifax area, and to develop a proposal to AES on how enhanced climate research in the region would contribute to the objectives of the proposed Canadian Climate Research Network. The one day workshop was attended by over 30 researchers mainly from the Bedford Institute of Oceanography (BIO) and from Dalhousie University (DAL), although there were also representatives from other Universities involved in research into atmosphere-ocean modelling (Lamont-Doherty Geological Observatory, McGill, Memorial and Victoria). In sponsoring the workshop, AES was inviting these scientists to join in meeting the challenge laid out in the Green Plan Global Warming Science Program to improve Canada's ability to understand and predict climate.

Report:

The morning was devoted to several overview presentations which documented the climate research activities being carried out in the Halifax region. Dan Wright (BIO) began with a succinct discussion of the need for low-order climate models. First, the efficiency of these models (e.g. a 1000 year simulation with the Wright/Stocker coupled ocean-atmosphere climate model takes approximately one hour on a single processor of BIO's STARDENT computer) is a major advantage in fulfilling the requirements of climate models. These include: (1) the need to consider coupled ocean-atmosphere-cryosphere-carbon cycle models; (2) the need to consider truly global scales; (3) the need to consider time scales extending to many millennia; and (4) the need to do sensitivity studies in order to verify the robustness of results. Second, he emphasized the role of low-order models in improving our basic understanding of the climate system. Building a low-order model requires that the most critical elements of the climate system be identified and incorporated, and once built, the general transparency of the models helps investigators learn quickly from both the successes and failures of model simulations. The efficiency and transparency of these models thus makes them a useful tool in attempting to unravel the intricacies of the climate system. As an example of the utility of these models, Dan presented results which demonstrated the ability to realistically simulate the cooling which occurred during the Younger Dryas climate event, including the lag between meltwater input and the circulation change, and the timing of the re-establishment of the modern circulation. A sequence of 10,000 year time series were shown to illustrate that reduction of the runoff into the North Atlantic by just 35% is sufficient to qualitatively change the transient response to meltwater input during the last deglaciation, resulting in a far more realistic simulation of this event than had been previously obtained. Dan concluded that he saw the role of

low-order models as one of complementing GCMs by contributing to our understanding of the climate system at global spatial scales and at time scales of centuries and longer. Further tests, improvements and usage of the Wright/Stocker model are being carried out in collaboration with researchers at Lamont-Doherty Geological Observatory (Stocker), Dalhousie University (Lesins/Hyde), and the University of Victoria (Weaver).

Allyn Clarke (BIO) provided an overview of current research activities in the Halifax area on regional scale ocean models. Recently, this research has been nearly exclusively focused on the dynamics and thermodynamics of east coast shelf circulations given the availability of special funding for these areas. The overview included work on interactions between atmospheric forcing, shelf and mixed layer dynamics and the evolution of the Labrador ice pack (Ikeda, BIO), on cross-shelf exchange for the Scotian Shelf (Cahill, DAL), the real time assimilation of oceanographic data into a 3-D shelf model (Sheng and Thompson, DAL), and the development of an efficient 3-D ocean model based on the Bryan-Cox code (Tee, BIO). The point was made that these and other modelling activities in the region were being carried out in close collaboration with the observational community. Participants were reminded that convective processes, a key link in the thermohaline circulation described and modelled by Dan Wright, take place in the western North Atlantic adjacent to these shelf circulations. The observational evidence indicates these processes are quite variable on time-scales of several years to decades and centuries. The initial indication of this variability are changes in the salinity of the surface waters in the convective regions; present models and observations are insufficient to determine whether these salinity changes arise through regional changes in E-P, changes in the magnitude of the shelf circulations, changes in the exchanges between the shelf and the open water, or changes in the sea-ice transport along and off the shelves. It was argued that we do not yet have a North Atlantic circulation model that includes the shelf circulation or the interaction of the atmosphere with the ocean at the scale of important ocean regions and fronts.

Glen Lesins (DAL) provided an overview of the importance of understanding and modelling air-sea fluxes in studies of climate change, along with a summary of research activities in air-sea interaction in the Halifax area. It was pointed out that the effective coupling of the ocean and the atmosphere is essential for understanding climate change. However, there are major deficiencies in all the various parameterizations used to represent the marine boundary layer, and there is little accurate field data around for evaluation purposes. The importance of proper specification of the processes taking place in the marine boundary layer was highlighted in a comparison of ECMWF output which showed a dramatic improvement in the monsoonal circulation over the Indian Ocean and Western Pacific where a more accurate low wind speed parameterization of the drag coefficient was used. Glen went on to outline numerous areas of uncertainty in feedbacks between the ocean and the atmosphere such as the coupling and evolution of sea surface temperature (SST) anomalies and surface wind anomalies, the cirrus thermostat concept for limiting tropical SSTs, and the

CLIMATE RESEARCH NEWS (Cont.)

relationship between SST gradients and storm tracks. The coupling of the hydrological cycle into the marine boundary layer was also noted as an area requiring further work. For example, precipitation and evaporation are poorly specified over the oceans yet these connect the fresh water flux of the atmosphere to the salinity flux in the oceans. As Dan Wright showed, the hydrological cycle feedback has major implications for the global thermohaline circulation. In summary, Glen concluded there was:

- (1) a need for better measurements of sensible and latent heat, momentum, precipitation and gas fluxes across the air-sea interface;
- (2) a need to improve the parameterizations of these fluxes for use in GCMs, low order models and theoretical studies of climate;
- (3) a need to develop theories and conceptual models for the way air-sea fluxes feedback on the thermodynamics and dynamics of the ocean and the atmosphere in order to understand climate variability.

Dan Kelley (DAL) emphasized the need for the study of key climate processes to complement numerical modelling studies. He mentioned deep convection and vertical mixing in the ocean interior as two examples of processes which are thought to influence thermohaline circulation, but which are not properly represented in present numerical models. A goal of the study of such processes would be to develop more accurate parameterizations of sub-gridscale phenomena for use in numerical models. Work is also under way on these two topics at Dalhousie/BIO in the form of laboratory convection studies (Kelley/Brickman), and field measurements of K_v in the North Atlantic using dye injection and microstructure profiling (Ruddick/Oakey). Each of the above projects is funded by the Canadian WOCE program, an international project designed from its beginnings as a component of the World Climate Research Program. The secretariat for the Canadian component of WOCE rests at Dalhousie. Barry Ruddick (DAL), chair of the WOCE secretariat, gave a summary of relevant research being carried out under this and the related JGOFS program, which also has its secretariat at Dalhousie.

In discussing the research priorities for a Halifax node, Dan Wright presented a number of topics which he saw as high priority areas for future research. These were organized under two general themes:

- (1) Low-Order Models:
 - develop simple atmospheric models with an interactive hydrological cycle;
 - develop and study coupled ocean/atmosphere/ice models;
 - inclusion of a representation of the carbon cycle to study its climatic influence;
 - explicit inclusion of ice sheets to facilitate paleoclimate studies.
- (2) Regional Models/Process Studies:
 - parameterization of penetrative and non-penetrative convection;
 - representation of isopycnal and diapycnal mixing in

ocean models;

- cross-shelf and slope exchange (how fresh water gets off the shelf into the deep ocean);
- water-mass renewal and spreading - buoyancy and wind forcing;
- air/sea/ice interactions/feedbacks and decadal variability;
- inter-comparison of process oriented models with data and GCMs.

John Stone indicated it was critical for the Halifax node to have a clearly focused theme and suggested this be related to the coupling of the hydrological cycle into ocean circulation models. This coupling is essential for GCMs, ties in with the objectives of GEWEX, and is a suitable framework for integrating the expertise of the Halifax area e.g. low-order coupled climate models, air-sea interaction and regional-scale ocean circulation modelling. This suggestion met with the approval of a number of scientists at the workshop, and it was agreed that a more detailed proposal on the slightly broader theme of **the role of ocean-atmosphere water fluxes in the climate system** would be prepared in consultation with AES, and be discussed at the next meeting of the National Climate Research Committee in December. If agreed to by the Research Committee, John indicated that a Halifax node could be funded out of the 93/94 budget. John informed the workshop attendees that the AES/NSERC Science Subvention Program will provide an alternative source of support for university researchers whose activities may not be supported through the Halifax node, but whose work will nonetheless contribute to greater understanding of climate change. This Program will be enhanced by Green Plan funding and will be seeking proposals related to climate change. John recognized there was a need to place more emphasis on excellence in the granting process and indicated that this would definitely be the case in the enhanced AES/NSERC Science Subvention Program. BIO scientists expressed the concern that relying too heavily on the AES/NSERC granting process could have an adverse effect on productive researchers in government laboratories: e.g. BIO has little funding support for ocean modelling research yet they have considerable expertise to contribute to the Climate Research Network.

Paleoclimate Workshop:

The Geological Survey of Canada, the Canadian Climate Centre and the Royal Society of Canada jointly sponsored a workshop in Ottawa on November 21-22, to develop a collaborative research proposal to carry out paleoclimatic simulations with the Canadian Climate Centre GCM. The workshop focused on reconstructing the climate of the 6k BP warm period which isolates the effect of different solar radiation input to the climate system. The workshop brought together invited scientists from the Canadian paleo- and climate modelling communities to address a range of topics which included: types of proxy climate data and their use in developing a more complete 6k paleoclimatic map; transfer functions and methods of quantification; development of a paleoclimate database; GCM validation; and links between climate modellers and paleoenvironmentalists. A full report will appear in the next issue of the C.M.O.S. Newsletter.

CLIMATE RESEARCH NEWS (Cont.)

Up-Coming Climate-Related Research Meetings in Canada:

Calgary, December 4-6, 1992: Canadian Peatlands Workshop (Canadian Global Change Program). Contact: Dr. Dale Vitt, (403) 492-3380 or Marie Ross, (613) 991-5639.

Fredericton, June 8-11, 1993: Twenty-Seventh Annual CMOS Congress. The Congress will feature a theme session on climate modelling. Contact: Dr. John Loder, Chairman, Scientific Program Committee, (902) 426-4960.

Québec City, June 8-10, 1993: 50th Anniversary of the Eastern Snow Conference. The conference will include a theme session on Snow and Ice Studies Related to Energy Budget or Global Warming Investigations (deadline for receipt of abstracts was December 1, 1992). Contact: Derrill J. Cowing, ESC Program Chairman, U.S. Geological Survey, Water Resources Division, 26 Ganneston Drive, Augusta, Maine 04330.

Calgary, September 12-18, 1993: The International Society of Biometeorology Thirteenth International Congress of Biometeorology. The theme of this congress is adaptations to global atmospheric change and variability. The congress will address issues of human, animal, plant, invertebrates and microorganisms in relation to climate change and variability. Contact: Dr. N. Barthakur, (514) 398-7938.

Montréal, September 23-28, 1993: The Second International Design for Extreme Environments Assembly (IDEEA Two). This conference will bring together professionals from many countries and environmental settings to look at habitats and operations in difficult settings. The environments include Arctic regions, mountains and the oceans, and the conference will emphasize issues such as sustainable development, design/construction, environmental impacts and policy/law. (Although not specifically mentioned, climate change cuts across all these issues). The deadline for abstracts is February 15, 1993. Contact: Centre for Northern Studies and Research, (514) 398-6052.

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The University of British Columbia ATMOSPHERIC SCIENCE PROGRAM Department of Geography

The University of British Columbia has a tenure track position at the Assistant Professor level in Atmospheric Science, to be appointed in the Department of Geography by July 1, 1993. The position is subject to final budgetary approval. The Atmospheric Science Program at UBC is offered jointly by the Departments of Geography and Oceanography, with research and teaching concentrated on surface- and boundary-layer processes, mesoscale dynamics, atmosphere-ocean interactions, cloud physics, air quality and remote sensing.

We seek candidates who can complement and extend any of our established areas of research and teaching, but have a particular interest in studies of the planetary boundary-layer. There are also opportunities to build links with colleagues in Soil Science, Environmental Chemistry, Applied Science and Geophysics. The successful candidate will be expected to have a commitment to excellence in teaching and research, and to offer both undergraduate and graduate courses, and supervise graduate students.

The University of British Columbia welcomes all qualified applicants, especially women, aboriginal people, visible minorities, and persons with disabilities. In accordance with Canadian immigration requirements, this advertisement is directed, in the first instance to Canadian citizens and permanent residents of Canada.

Applicants must have completed their Ph.D. degree. Post Doctoral experience will be a distinct advantage. Applications must be received by **December 31, 1992** and should be accompanied by a resume, examples of recent publications, and the names of three referees. Apply in writing to:



Dr. D. G. Steyn, Chair
Atmospheric Science Program, Department of Geography
The University of British Columbia
1984 West Mall, Vancouver, B.C. V6T 1Z2
Tel: (604) 822-6407 Fax: (604) 822-6150

Post-doctoral positions in Middle Atmosphere Modelling

Applications are invited for several post-doctoral positions in a collaborative Middle Atmosphere Modelling project involving the University of Toronto, York University, McGill University, l'Université du Québec à Montréal, and the Atmospheric Environment Service of Canada. Qualified personnel are sought in the areas of large-scale dynamics and transport, gravity-wave drag, radiation, and chemical modelling and transport. Applicants should have a recent Ph.D. in atmospheric science or a related area. The positions must be held at one of the four above-mentioned universities, and the salary level will be set according to the guidelines of the host university. The positions are expected to be available from January 1993, and to last for up to three years.

Members of the project include: T.G. Shepherd (University of Toronto); J.C. McConnell, G.P. Klaassen (York University); J. Derome (McGill University); R. Laprise, J.-P. Blanchet (UQAM); N.A. McFarlane, J.C. Fyfe (AES).

Applicants should send a curriculum vitae as well as the names of two referees. For further information contact: Prof. T.G. Shepherd, Department of Physics, University of Toronto, Toronto, Ontario M5S 1A7 Canada (tel: 416-978-6824; fax: 416-978-8905; email: tgs@rainbow.physics.utoronto.ca).

A Thermocline Model for Ocean-climate Studies

Charles A. Lin, McGill University, Montreal, Quebec Richard Greatbatch, Memorial University, St. John's, Newfoundland

The WOCE (World Ocean Circulation Experiment) project to formulate a thermocline model for ocean-climate studies is now nearing completion. The work forms the doctoral thesis of McGill graduate student Sheng Zhang, and has already resulted in two papers (Zhang, Lin and Greatbatch, 1992: *J. Mar. Res.* 50, 99-124; Zhang, Greatbatch and Lin, 1992: *J. Phys. Oceanogr.*, in press). A third article is now in preparation.

A 3-dimensional planetary geostrophic (PG) ocean general circulation model in spherical coordinates has been formulated and thoroughly tested. The model equations consist of full prognostic temperature and salinity equations and diagnostic momentum equations. A simple linear friction is used to close the barotropic circulation at the western boundary. An extensive comparison and sensitivity study has been performed, using published results of the Cox-Bryan primitive equation model as comparison. The PG model is able to reproduce the steady state thermocline structure and thermohaline circulation of an idealized ocean basin as simulated by the Cox-Bryan model, with much lower computational costs. It also displays a similar sensitivity for a variety of model parameters.

We have examined the crucial role of convective overturning in providing a source of cold, dense water at depth. The implications of these results to 2-dimensional zonally averaged models are discussed. In particular, we show that the parameterizations used in zonally averaged models to relate the east-west pressure difference to the north-south pressure gradient are not valid when convective overturning is turned off.

The model has also been used to re-examine the "polar halocline catastrophe" (PHC; Bryan, 1986: *Nature* 323, 301-304). Previous explanations of the PHC have focused on the role of the fresh water flux in establishing a fresh water cap and shutting off deep convection. In this case, the surface boundary condition used for temperature is a restoring condition of the top layer temperature (T_1) to an effective atmospheric temperature (T_a), with a time scale given by the reciprocal of the restoring constant (K).

$$\rho c_p h (\partial T_1 / \partial t) = K(T_a - T_1) + \text{dynamics} \quad (1)$$

Here, ρ , c_p , h and t denote the density, specific heat, top layer depth and time respectively; advective, convective and mixing processes are included in the dynamics term. With (1) as the surface temperature boundary condition, there is a reduction in the surface heat loss to the atmosphere which accompanies the PHC. Indeed, this reduction is crucial to the occurrence of the PHC. This is shown by changing (1) to a flux boundary condition, where the surface heat flux (FLUX) is diagnosed before the onset of the PHC.

$$\rho c_p h (\partial T_1 / \partial t) = \text{FLUX} + \text{dynamics} \quad (2)$$

With (2) as the surface boundary condition for temperature,

the PHC does not occur. Physically, (1) corresponds to an atmosphere with infinite heat capacity, as the effective atmospheric temperature T_a is held fixed. In this case, the atmospheric heat budget cannot be satisfied when a PHC occurs, as the surface heat flux is reduced. Conversely, (2) corresponds to an unchanging atmospheric heat budget, as the surface heat flux is held constant. The real atmosphere lies somewhere between these limits, which suggests a weakened PHC rather than its complete elimination. To show this, we have coupled the model to a zero heat capacity atmospheric model (Schopf, 1983: *J. Phys. Oceanogr.* 13, 1878-1893). This results in a surface temperature boundary condition which is intermediate between (1) and (2).

$$\rho c_p h (\partial T_1 / \partial t) = (1 - \epsilon) \text{FLUX} + \epsilon K(T_a - T_1) + \text{dynamics} \quad (2)$$

Here, $(\epsilon K)^{-1}$ gives the time scale of radiative relaxation by the atmosphere, which is typically much longer than the time scale given by K^{-1} ; i.e., $\epsilon \ll 1$. The occurrence of the PHC then depends on the precise value of the parameter ϵ . These results suggest that in the coupled atmosphere-ocean system, the occurrence of the PHC could be inhibited.

There are now continuing experiments to examine the effect of including a thermodynamic sea-ice model on the occurrence of the PHC.

This work is supported by the Natural Sciences and Engineering Research Council of Canada through the Collaborative Special Project program.

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A unified theory of available potential energy.
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A non-isotropic gauge interpolation scheme applied to the Montréal rainstorm of 14 July, 1987. A. Bellon, M. Duncan and G.L. Austin.

On modelling geophysical flows having low Rossby numbers.
David E. Dietrich.

A three-dimensional numerical model of suspended sediment transport in Howe Sound, British Columbia. J.A. Stronach, A.J. Webb, T.S. Murty and W.J. Cretney.

A search for evidence of critical wave reflection on the continental rise and slope off Nova Scotia.
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A review of analytical models of sea-ice growth.
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When ice melts in sea-water: A review.
Herman Gade.

Research Note:

On residual currents in the central Strait of Georgia, B.C.
Greg Holloway

CARBON DYNAMICS IN MARGINAL SEDIMENTS: MATHEMATICAL MODELLING OF CARBON AND NUTRIENT REGENERATION

Bernard P. Boudreau

Department of Oceanography Dalhousie University

A quantitative understanding of carbon and nutrient dynamics in the benthic environment is difficult because preservation and regeneration are functions of a complex interaction between chemical, biological, physical and sedimentological processes. (Collectively these are called diagenesis.) It is possible, in principle, to obtain this quantitative understanding solely by measurements of benthic rates and fluxes; however, in practice this is not a viable option. Rate measurements cannot generally be made *in situ* and laboratory determinations must somehow be verified as reflecting natural rates. Flux measurements must also be interpreted using a model. Furthermore, a purely observational or experimental approach cannot predict quantitatively how a complex system, such as marine sediments, will respond to perturbations. Mathematical modelling offers a powerful approach to overcome these difficulties.

The ultimate aim of this project is the formulation and solution of a model for sedimentary carbon and nutrient burial and recycling that can be used to investigate the response of the benthic system to temporal changes in the input of organic matter to the sediment-water interface, either because of seasonality or related to global change. This will only be possible if benthic processes can be properly represented in a mathematical model. The processes of diagenesis are quite varied, and a large part of the challenge in this project is to arrive at reasonable representations. At the same time, this does not discount the problems in solving the model once it has been formulated.

Mechanistic diagenetic models describe the space and time, t , distributions of organic carbon as a component of the sediment solids and nutrient and oxidant species as components of the porewaters. For example, if G is the concentration of the reactive organic matter in the solids, then the distribution of this variable is governed by a conservation equation of the form

$$\frac{\partial G}{\partial t} = \Lambda(x, t, G, C_1, C_2, \dots, C_m, B_{\text{mix}}, T) + \Sigma R(x, t, G, C_1, C_2, \dots, C_m, T) \quad (1)$$

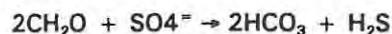
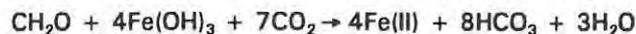
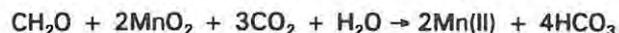
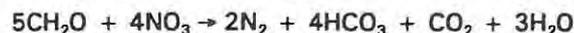
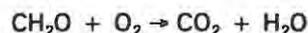
Here x is the position vector (x, y, z) in the sediment, $\Lambda(x, \dots)$ is the operator that accounts for the effects of transport, i.e. bioturbation, irrigation, advection and physical disturbance and $R(x, \dots)$ accounts for reactions affecting the organic matter, i.e. decay, where C_1, C_2, \dots , are the concentrations of the m possible organic matter oxidants, B_{mix} characterizes the biomass of bioturbating organisms, and T is the temperature. Each species that is affected by or affects the diagenesis of organic matter will have an equivalent (coupled) conservation equation. The problem lies in specifying the

appropriate forms for $\Lambda()$ and $R()$. The observational and experimental studies of JGOFS Benthic Processes Study will supply valuable information in this regard; however, with some processes, intuition is the only guide.

Equation (1) contains transport processes that are both familiar, such as advection (due to burial), and unusual, such as the mixing of solids by macro-organisms (bioturbation) and the deep renewal of porewaters by tube dwelling organisms irrigating their burrows. If some of these less familiar transport processes can be modelled as diffusion-like phenomenon, then equation (1) is a partial differential equation. However, both observation and intuition argue that biological mixing and irrigation are fundamentally nonlocal, and equation (1) may be an integro-differential equation.

The existence of sand environments in marginal areas leads to other transport mechanisms not usually considered in mud environments. The high permeabilities of sands allows pressure changes related to waves, tides and even turbulence to induce porewater movement and dispersion that can, considerably supplement molecular diffusion. Sand wave-forms cause horizontal pressure gradients that lead to convective transport in the sands. There may be enhanced transport near the sediment-water interface due to flow penetration and consequent fluid dispersion because the Rno-slip condition may be violated. Dr. K.T. Shum (a JGOFS associated researcher at IML) has made remarkable progress in modelling wave-induced transport, but much remains to be done on the other processes.

If equation (1) differs appreciably from the familiar equations of fluid dynamics, it does so most evidently with respect to the presence of the important biogeochemical reaction term $R()$. Microbial decay is the most important such reaction, and it oxidizes organic carbon to an inorganic form. Benthic micro-organisms are not limited to one type of oxidation reaction. Instead, they utilize a sequence of oxidants, i.e. O_2 , NO_3 , MnO_2 , $Fe(OH)_3$, SO_4 and then organic matter (CH_2O) itself, i.e.



Likely mathematical forms for the kinetics of these reactions are known, i.e. linear in organic matter concentration, G , a Monod-type dependence on the current oxidant, and inhibition from the presence of more preferred oxidants in the form of rational functions in their concentrations. Inclusion of these forms into equation (1) leads to a set of coupled nonlinear equations. Some steady state solutions exist for deep-sea conditions where only O_2 , NO_3 and MnO_2 are present; however, nothing has been done for marginal sediments where all these reactions are important and transient inputs are an important feature. In addition, such models have yet to include the effects of the simultaneous reduction of O_2

with reduced by-products, e.g. H₂S above. This also involves nonlinear forms.

Therefore, the resulting model will be highly nonlinear and considerable effort will be expended to find an efficient solution technique. Numerical methods are a necessity, but the equations are known to be stiff. The programming effort will not be trivial.

Decomposition and Transport of Organic Matter in Continental Shelf and Slope Sediments

J. Grant, D.G. Webb and A. Hatcher
Dept. of Oceanography, Dalhousie Univ.

Until recently the widely accepted perception of continental shelf sediments was that much of the incorporated organic matter was highly refractory and not amenable to biological degradation. The generality of this perception has been questioned recently because of studies that show rapid carbon turnover rates which show substantial variation because of differences in sediment grain size (Grant *et al.*, 1991). Our research program is designed to elucidate some of the forcing variables on organic matter degradation in continental shelf and slope sediments off the coast of eastern Canada.

It is evident from many studies of sediment metabolism that sediment grain size and organic matter input are important forcing variables on the carbon mineralization rate. The interactive role of these factors with intensity of near-bottom flows on the continental shelf is potentially important (Hopkinson, 1985), but not well studied. To examine this interaction we are using laboratory flumes, a wave tank, and supporting empirical data gathered at sites chosen by the JGOFS Benthic Processes Group (3 sites on the Scotian Shelf and 5 in the Gulf of St. Lawrence). Our laboratory flume measurements are designed to model the interactive roles of sediment grain size, organic supply rate and near-bottom flow in the passive deposition of organic material to the seabed and its consequent decomposition leading to carbon mineralization. We are initially concentrating our efforts in determining the deposition rates of organic material into coarse sediments (e.g. coarse sands and gravel) which are a conspicuous feature of many continental shelves (Grant *et al.*, 1991). These coarse deposits often have extremely low carbon content (<1%) and are in areas characterized by high near-bottom current speeds. We propose that the high level of sediment permeability and bottom roughness present in areas dominated by coarse sediments enhances sedimentation and mineralization. To test this proposition we are examining the advective turnover and decomposition of organic material in sediment systems placed in a recirculating flume. We are concentrating on a comparison of coarse and fine sediments, performing experiments at a series of flow velocities. We are concentrating on the relationship between bottom shear stress and net deposition of organic material at a variety of particle-loading rates using inert tracers and cultured phytoplankton.

In the wave tank at the Aquatron Laboratory of Dalhousie University we are examining the influence of long-period internal waves and swells which impact on the sediments of the continental shelf. Waves significantly affect the pressure field above the sediment and influence diffusive transport of dissolved and particulate organic material, especially in coarse sediments. Our wave-tank experiments are designed to examine the interaction of sediment grain size, organic supply rate and intensity and duration of oscillatory flows on net organic deposition and decomposition rates.

The decomposition rates of organic material are being estimated in a variety of ways in the experimental sediment systems and in the cores collected at the JGOFS study sites. Sediment community respiration will be measured using a temperature-controlled core incubation system and aerobic and anaerobic metabolism initially partitioned using differences in the O₂ and CO₂ flux rates. Longer-term integrated metabolic rates will be inferred from porewater profiles of O₂, CO₂, NH₄⁺, NO₂³⁻, NO₃³⁻ and H₂S and these data will also be used in the mathematical models of diagenesis to be generated by Boudreau (this issue).

The complementary laboratory experiments and field observations examining the interactive roles of near-bottom flows and sediment grain size on sedimentation, resuspension and decomposition rate will be used to evaluate the relative importance of various processes in the carbon budget of shelf sediments. The incorporation of these data into diagenetic models will be a significant step in elucidating the role of continental shelves in global carbon flux.

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Fourth Year of Canadian JGOFS Studies in the North Atlantic Completed with CSS HUDSON Cruise to Coast of Morocco

W.G. Harrison, Biological Oceanography Division, Bedford Institute of Oceanography, P.O. Box 1006, Dartmouth, NS, Canada B2Y 4A2

Canada has been a major player in the development and implementation of JGOFS and has for the past four years maintained a vigorous North Atlantic field program at the Bedford Institute of Oceanography, (BIO) in support of the international study (see also C.M.O.S. Newsletter article by E.P. Jones, June 1992) Canada was one of the five nations participating in the first major JGOFS field effort in 1989, the North Atlantic Pilot Study; scientists from the Biological Oceanography Division (BOD) at BIO, sailing aboard CSS BAFFIN, investigated the western north Atlantic bloom while other participating countries worked in the eastern Atlantic.

JGOFS News (Cont.)

CJGOFS Stations (1989-1992)

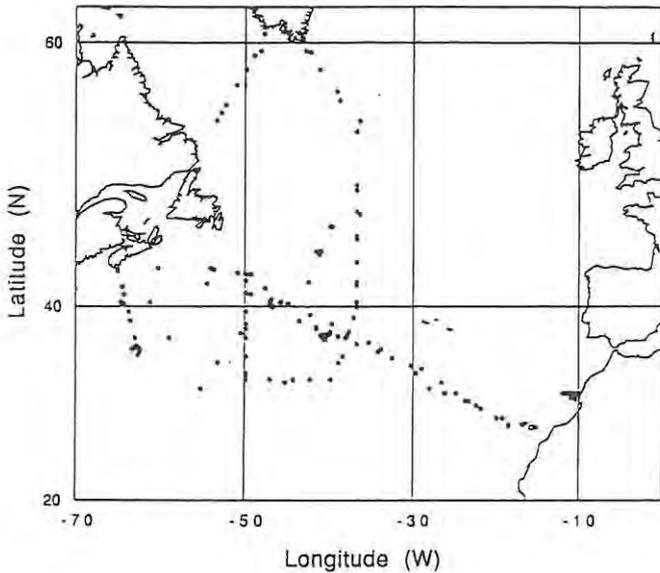


Figure 1. CJGOFS hydrographic and biological stations occupied by BOD from 1989 to 1992.

BOD scientists continued their studies of the North Atlantic spring bloom aboard CSS HUDSON in 1990 and 1991 and participated in the 1991 North Atlantic/Labrador Sea WOCE cruise (see C.M.O.S. Newsletter article by R. Hendry, February 1992). In 1992 their work shifted from temperate to subtropical waters with a 35 day trans- Atlantic voyage from Nova Scotia to the coast of Morocco (Fig. 1).

The Canadian National JGOFS Programme identifies three major themes that focus on the biogeochemical processes which control and modify the amounts of carbon and associated biogenic elements in the ocean: (1) Inputs at the sea surface, (2) transformations and transport within the ocean and (3) processes leading to burial on the sea floor. BOD research has concentrated on theme 2 and more specifically on the distribution, productivity and interactions between primary and secondary producers and parameterization of the associated processes for modelling and remote sensing applications.

BOD research has emphasized the dual importance of field work and remote sensing in meeting JGOFS goals. Preliminary calculations of the annual primary production of the North Atlantic using satellite ocean colour data have already been made by this laboratory (see C.M.O.S. Newsletter article by Sathyendranath and Platt, October, 1992) but refinements are necessary. For example, a better understanding of the time and space scales of variability, in the biological

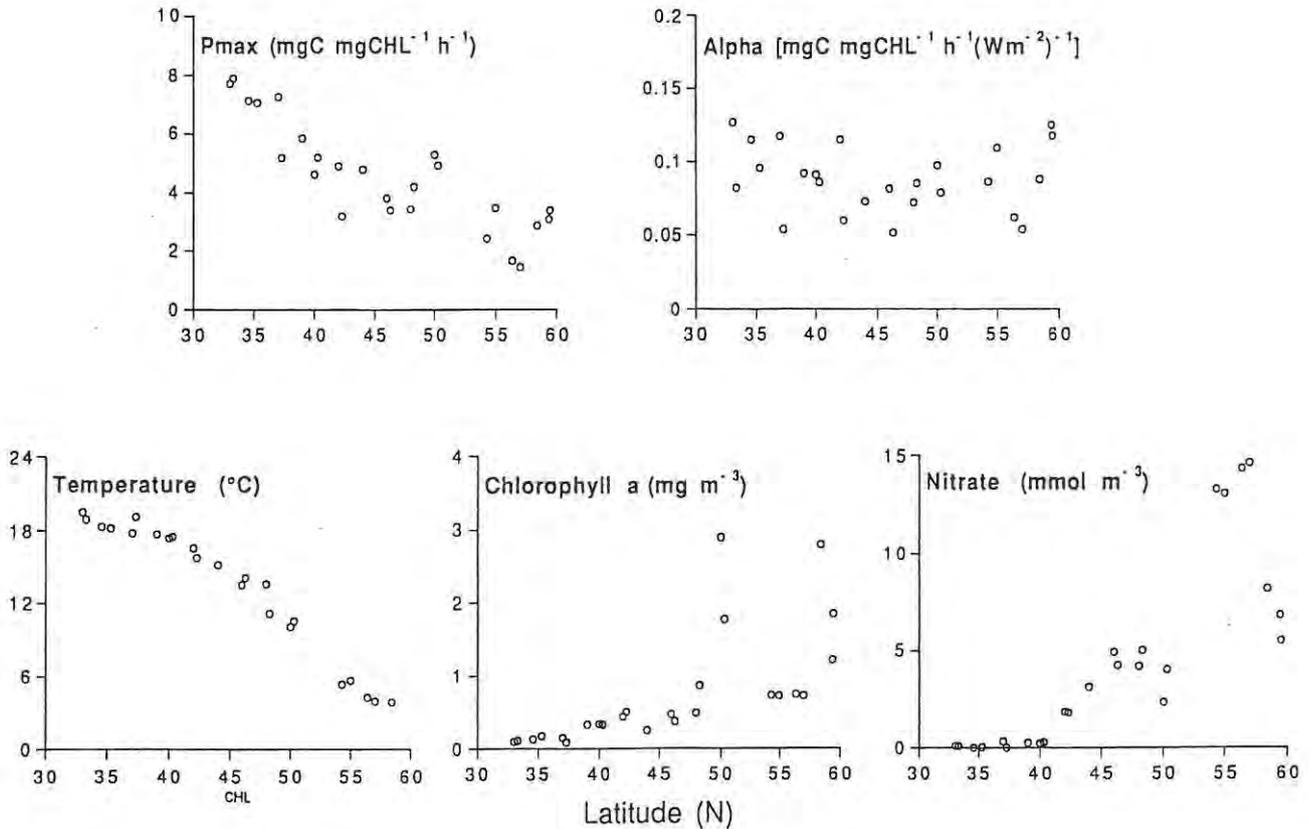


Figure 2. Latitudinal variations in chlorophyll, photosynthetic parameters (Pmax, Alpha) and environmental properties from the WOCE (1991) 40°W line.

JGOFS News (Cont.)

parameters of photosynthesis (Fig. 2) will be required to improve current production estimates using, satellite data. BOD's expansive station coverage and use of consistent measurement methodologies over the past four years have clearly advanced this understanding with regard to the North Atlantic.

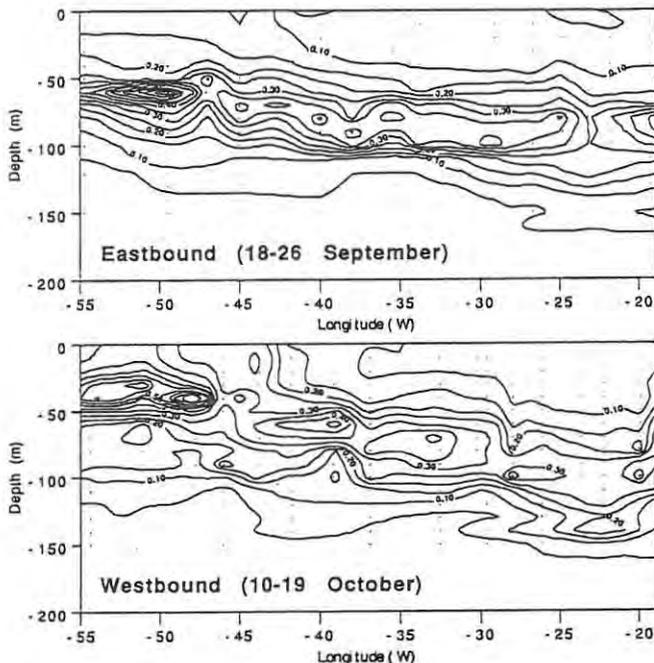


Figure 3. Ocean-basin scale variations in chlorophyll distribution in the upper ocean: eastbound and westbound trans-Atlantic sections of BOD's 1992 JGOFS cruise.

The 1992 trans-Atlantic expedition provided a unique opportunity to investigate large, ocean-basin scale variations in these critical biological parameters (Fig. 3). It also provided, through a joint Venture Agreement, a unique opportunity for biologists to work closely with atmospheric scientists on problems of mutual interest. In particular, four scientists from the European Joint Research Centre (JRC) studying the atmospheric sulphur cycle made measurements of atmospheric and in-water dimethylsulphide (DMS) concentrations simultaneous with BOD's plankton measurements. DMS is a metabolic by-product of phytoplankton metabolism and has been linked to atmospheric cloud dynamics (i.e., the formation of cloud condensation nuclei, CCN). The large spatial coverage (and dynamic range of biological properties) of this cruise should reveal any relationships between observed variations in DMS and biological properties. Plans are underway to repeat many of the same biological and atmospheric measurements in the spring of 1993 when the CSS HUDSON will be working in the Canary Basin as part of the WOCE North Atlantic Tracer Release Experiment, NATRE (see C.M.O.S. Newsletter article by, Ruddick et al, October 1992). This should provide an interesting biological contrast to the 1992 studies since spring is the season of maximum biological activity compared to the ebb in activity in fall.

Global Ocean Euphotic Zone Study (GOEZO)

Ken Denman, Institute of Ocean Sciences

The Global Ocean Euphotic Zone Study is a potential core programme of the International Geosphere-Biosphere Programme (IGBP) being planned jointly with the Scientific Committee on Oceanic Research (SCOR). GOEZO will focus on the coupled physical, biological and chemical processes operating in the ocean surface layer. ('euphotic zone' means the ocean surface layer where enough light penetrates for photosynthesis by phytoplankton to exceed their metabolic energy losses.) The upper ocean is extremely important to understanding the atmosphere-ocean system because it mediates exchanges of heat, momentum, carbon dioxide, sulphur, nitrogen, etc. between the atmosphere and the ocean interior. For the major greenhouse gas carbon dioxide for example, there is more carbon in the upper ocean than in the whole atmosphere. Essentially all carbon dioxide from the atmosphere that passes from the upper ocean to the ocean interior has been transformed chemically or biologically in the upper ocean. The upper ocean is the site of all marine shipping, most recreation and industrial activity, and contains the planktonic food chain and most fish stocks.

In April 1992, Ken Denman of the Institute of Ocean Sciences chaired an ad hoc working group convened jointly by IGBP and SCOR to discuss the scientific rationale for GOEZO. Participants attended from Canada, UK, France, USA, Australia and Sweden. GOEZO would follow on from WOCE, TOGA and JGOFS, with the draft goal "To understand small-scale changes in the structure and function of the connected physics, chemistry and biology of the upper ocean system and how these changes interact with larger-scale changes in physical forcing (air-sea fluxes); and to improve predictive capability of large-scale change on interannual and larger timescales." The second part of the goal - "to improve predictive capability ..." includes interannual and longer time scale changes in the structure and function of the marine foodchains that might accompany climate change.

The meeting report was reviewed at executive meetings of SCOR and IGBP. Ken Denman will convene another workshop on GOEZO at the Third Meeting of the Scientific Advisory Committee for IGBP in January 1993 in Ensenada, Mexico. The working group will be reconstituted under IGBP and SCOR (with possible support from the World Climate Research Programme) and plans to continue scientific planning with a meeting in June 1993 at Southampton, UK focused on examining the parameterizations of small scale physical, chemical and biological processes in models of the upper ocean. A scientific symposium and subsequent modelling activities are planned with field work beginning after 1997. Comments and expressions of interest are welcome. (K.DENMAN on OMNET or denman@ios.bc.ca on Internet).

REVIEWS/CRITIQUES

The State of Canada's Environment, published by the Canada Communication Group - Publishing, Government of Canada, Ottawa, 1991. Available in both English and French for \$29.95 plus taxes. 724 pages

This volume is the second national state of the environment report, the first appearing in 1986. It is an impressive volume that addresses four fundamental questions: "What are the key environmental conditions and trends in Canada? What are the links between human activities and environmental changes? What are the ecological, economic, and health implications of these changes? And, what are Canadians doing to address the concerns that have been identified?" The book is divided into 5 parts plus a glossary, index, etc. Part I is a short introduction to our ecosphere, while Part II is split into 13 chapters dealing with environmental components (e.g., atmosphere, oceans, fresh water) and activities (e.g., energy, fishery) that affect our environment. Chapters were generally prepared by consultants with input from government scientists; then the chapters were reviewed by members of the Public Advisory Committee on State of the Environment Reporting. Although I don't recognize the names of the consultants, the reviewers are all well-qualified individuals. The chapters are typically 25-30 pages with many figures and tables. The emphasis is on pollution so the atmospheric chapter deals with urban air pollution, acid rain, Arctic haze, ozone layer and global warming. The coverage is quite brief but Climate Change, Stratospheric Ozone and Acidic Deposition all get chapters of their own in Part IV, on Current Issues. The Oceans chapter deals with human activities affecting the oceans and their impacts. There are a few pages linking atmospheric and oceanic change. The chapter ends with a discussion of management strategies. Part III presents 6 regional case studies, spread in a politically correct way from coast to coast plus the Arctic. Part V, the conclusion, deals with the concepts of and actions needed to attain sustainable development.

This is not the kind of book that you sit down and read cover to cover. However, it is an excellent reference book with the type of information that is very useful when thinking about environmental issues or when responding to questions from students or the media. For people like me who enjoys reading short sections of encyclopedias for relaxation, this book is a real find. The book has been very-well prepared with the use of boxes and colours making the essential points stand out. For the price, it is an outstanding buy and I recommend it to all.

Gordon McBean
Department of Oceanography
University of British Columbia.

UNDERSTANDING CATASTROPHE. Janine Bourriau (Editor). Cambridge University Press, Cambridge, 1992, 213 pp., ISBN 0 521 41324 9.

The Oxford dictionary defines "catastrophe" as a sudden, widespread or noteworthy disaster, or an event subverting the system of things. Under this rather broad definition, a wide range of events or phenomena can be considered "catastrophic". It is this theme, and only this theme, that appears to provide the unifying linkage between the otherwise largely unrelated topic covered in the various chapters of the book "Understanding Catastrophe".

The diversity of the topics addressed in the book is, of course, not accidental. The publication is one of a series of books edited by staff at Darwin College, Cambridge as a means of cross-discipline communication between scientists, mathematicians, social scientists, historians and others on a number of common themes, in this case catastrophe. The various chapters are all prepared by authors who participated in a 1990 public lecture series at Darwin College, each a recognized specialist within his particular academic discipline. The broad range in the content, style and conclusions of the various chapters somewhat mirrors the wide diversity in disciplines of the authors. These include astronomy, geology, chemistry, mathematics, structural engineering, history, social sciences and philosophy.

I found the first two chapters, dealing with natural catastrophes at the cosmological and planetary scales, the most informative and interesting to read. Both are good reviews of current scientific understanding presented in layman terms. The first chapter describes in a comprehensive manner the processes that lead up to and take place during a supernova, as well as the consequences and the enormous energies involved, using good analogues for illustration. For example, it puts the density of a neutron star into perspective by comparing the mass of one teaspoon of its matter to that of all of Mount Everest, while pointing out that the light released by a supernova, equal to that of 10 billion suns, represents but 1% of the total energy lost by the star during the catastrophe. The second chapter deals with mass extinction of species during the earth's history, particularly that of the dinosaurs and other species some 65 million years ago. This type of catastrophe is much smaller in scope than a supernova, yet colossal in planetary terms. The authors consider a range of theories that might explain such sudden discontinuities in the presence of certain species in time and space, including a review of the historical debate between catastrophists and uniformitists. However, they provide persuasive evidence to suggest that the prime cause for such extinctions may have been the large environmental changes caused by the impact of a large (10km diameter) asteroid, or near-simultaneous impacts of several smaller ones. Yet the authors acknowledge that there are significant gaps in the theory, and that the real story may be much more complex.

Chapters 3 and 4 deal with theory of catastrophe, rather than an analysis of a particular type of catastrophe. Both seem to be somewhat mistitled. Chapter 3, titled "Darwin and catastrophism", actually has very little to do with Darwin. The focus of the chapter is on the historical debate between uniformitists who hold that the present is the key to the past

REVIEWS/CRITIQUES (cont.)

and catastrophists who refuse "to limit the kingdoms of nature by the poverty of our own knowledge." This debate took place in the time of Darwin (1830s) and included him as a minor participant. According to the author, while catastrophism was the dominant basis for theorizing on natural processes in the early 19th century, the superior rhetoric of the chief uniformist of the time (Lyle) was so successful that catastrophism has remained a dirty word among scientists until the 1980s. I found the information on the nature of this debate and its significance to progress in geological sciences during the past 150 years particularly enlightening. Meanwhile, Chapter 4, on "Evolution and catastrophe theory", is primarily focused on a mathematical modelling approach to understanding catastrophe. Such modelling can help show that continuous causes of change can cause multiple discontinuous effects, whether in time, space or form. The author then applies such a mathematical model to Darwin's theories on the origins of species, demonstrating that multiple discontinuities in species are a logical consequence of continuous change. While the concepts presented in this chapter are of considerable interest, I found the manner of presentation disjointed and somewhat difficult to follow.

Chapters 5 and 6 change the focus from astronomical and geological scale catastrophes (few of which have occurred in human history) to natural events (earthquakes, cyclones and storms) that have been, and still are, very disruptive to human society. The chapter on earthquakes describes how they are caused and monitored, and how the study of earthquakes has helped understand planetary dynamics. However, it digresses into a rather disjointed assessment of historical examples of the catastrophic effect of earthquakes on humans. Likewise, Chapter 6 begins with a good review of the effect of wind on structures, the forces that cause high winds, the probability theories behind the concept of "return period" used in wind engineering, and the type of structural damage that can occur from different types of high winds. However, it is also somewhat lacking in good organization of the information provided. Both chapters could have benefited from substantial editing.

The final two chapters deal with catastrophes within human society. Famines (discussed in Chapter 7) are somewhat narrowly defined as "critical shortages of essential foodstuffs, leading through hunger to substantial increased mortality and collapse of social, political and moral order." Hence, only a few incidences of food shortage actually develop into famines. While one might expect meteorological droughts to be a primary cause of famines, the author here suggests that the final determinants of a famine are social breakdowns and other human elements, which can be, but are not necessarily, related to natural causes. Meanwhile Chapter 8 takes a historical approach to evaluating changing social responses to the diseases of consumption (particularly tuberculosis) over the last few centuries. This disease was initially (in the 18th century) blamed on "overconsumption" and soft living. During the 19th century, opinions reversed and deprived diets were blamed. Finally, as the better treatment available to the rich and the mighty reduced mortality in this social sector, the disease became associated with the squalid living of the poor. The author relates how these changing attitudes affected social attitudes of the time towards diet and healthy

lifestyles.

Did the book meet its stated objective of inter-disciplinary communication on a common theme? To the extent that it brought together a number of papers from vastly different disciplines, all having some claim to being connected to the broad definition of catastrophe, it did. However, the time and space scales, the nature, and the consequences of phenomena such as a stellar supernova and tuberculosis are so radically different that I found the common connection rather contrived. Furthermore, although I found all chapters of interest, the quality and style of writing varied considerably between chapters. The book could have been much more cohesive and readable with some heavy editing. As it stands, I might use the book if I was to pursue a study session on catastrophe theory, but recommend to readers that they go to other publications if they want thoroughly to understand the individual topics dealt with in the book.

Henry G. Hengeveld Atmospheric Environment Service

Natural Hazards

Journal of the International Society for the Prevention and Mitigation of Natural Hazards

Editors:

M. I. El-Sabbh, *University of Quebec at Rimouski, Canada*; G. Schelder, *University of Stuttgart, FRG*; Y. Tauchlya, *Kyoto University, Japan*.

Natural Hazards - the journal of the international Society for the Prevention and Mitigation of

Natural Hazards - is devoted to original research work on the physical aspects of natural hazards, the statistics of forecasting catastrophic events, risk assessment, and the nature of precursors of natural and/or technological hazards.

Although the origin of hazards can be different sources and systems (atmospheric, hydrologic, oceanographic, volcanologic, seismic, neotectonic), the environmental impacts are equally catastrophic. This circumstance warrants a tight interaction between the different scientific and operational disciplines, which should enhance the mitigation of hazards.

Hazards of interest to the journal are included in the following sections: general atmospheric, climatological, oceanographic, storm surges, tsunamis, floods, snow avalanches, landslides, erosion, earthquakes, volcanoes, man-made, technological, and risk assessment.

Natural Hazards is surveyed by *Geographical Abstracts*, *Geological Abstracts*, *Cambridge Scientific Abstracts*, *Journal in Earthquake Engineering*, *ISPEC Information Services*, *Meteorological and Geostrophical Abstracts*.

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Journal
Highlight

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Workshop on the Assimilation of Oceanographic and Atmospheric Data

Moto Ikeda (Department of Fisheries and Oceans) and Keith R. Thompson (Dalhousie University)

As models of the deep ocean and adjoining shelf seas improve, oceanographers are becoming more interested in data assimilation: the systematic blending together of data and dynamics. The motivation comes, in part, from a practical need to both nowcast and forecast the state of the ocean (e.g. for the initialization of coupled ocean-atmosphere models and forecasting ocean current fields around offshore structures in heavy ice and high wave conditions). Data assimilation has already proved useful in weather prediction, and the atmospheric science community has developed a range of schemes for operational purposes. Given the recent interest in data assimilation in the east coast oceanographic community, and a specific need for assimilative models for offshore development and fishery assessment, some experts in data assimilation methodology were invited to a two-day workshop at the Bedford Institute of Oceanography on the 6th and 7th of August, 1992. The workshop was organized by the Federal Department of Fisheries and Oceans and Dalhousie University.

The workshop began with two overview talks covering recent developments in data assimilation in both meteorology and oceanography, followed by 14 talks on specific applications. The talks focused mainly on Kalman filtering and variational methods, although there was some discussion of optimal interpolation and sequential updating. A brief summary of the papers given in five sessions is given below.

"Overview of Recent Developments in Data Assimilation": Pierre Gauthier (AES) discussed the methods currently used in atmospheric science and weather prediction including optimal interpolation, Kalman filtering and variational techniques. Kalman filtering was reported to be currently too expensive for operational purposes, but useful in the estimation of forecast errors in idealized situations. Carlisle Thacker (NOAA) reviewed inverse methods currently being used by oceanographers and illustrated, with a steady-state North Atlantic circulation model, some of the pitfalls awaiting the inexperienced practitioner.

"Assimilation of Ocean Water Property Data": Dmitri Nechaev and Max Yaremchuk (Shirshov Institute of Oceanology, Moscow) presented results from a variational method applied to WOCE section data from the Antarctic, and showed how absolute ocean currents along, and through, the section could be recovered. Gary Sneddon and Keith Thompson (Dalhousie) used the adjoint method to sort out the roles of air-sea fluxes and horizontal advection in the long-term changes in water temperature observed in the Northwest Atlantic. Marie-Claude Bourque (Dalhousie) also used a variational model to infer upwelling velocities from a time-sequence of vertical temperature profiles observed in Jacques-Cartier Strait. Brad deYoung (Memorial University) presented ocean flow fields diagnosed from objectively-analyzed water properties from the Northwest Atlantic and Newfoundland Shelf.

"Assimilation of Mesoscale Variabilities using Quasi-Geostrophic Models": Geir Evensen (Nansen Center, Bergen) outlined the use of the extended Kalman filter in QG models and discussed the stability problems that can arise in the propagation of error covariances. Moto Ikeda (DFO) used a sequential updating method for assimilating Geosat altimeter data to recover mesoscale features in the North Atlantic Current. He pointed out two potential problems of the altimeter data: low cross-track resolution and inefficient vertical projection. Liangzi Cong and Moto Ikeda (DFO) used a variational method in the reconstruction of Rossby wave fields from simulated altimeter data using an improved vertical projection method. Dmitri Nechaev and Max Yaremchuk discussed the difficulties in recovering mesoscale ocean flow fields - and, in particular, subsurface flows - from altimeter data in the presence of strong advection.

"Assimilation of Atmospheric Circulation Patterns": Saroja Polavarapu (AES) discussed the importance of correctly modelling the marine boundary layer when estimating sea level pressure fields. Pierre Gauthier illustrated the usefulness of the extended Kalman filter in the assessment of prediction errors and discussed the improvement in the definition of atmospheric circulation patterns that can result from the assimilation of Lidar data, particularly in the southern hemisphere. Will Perrie (DFO) and Wang (Dalhousie) showed the difficulties that can arise when the adjoint method of data assimilation is applied to the Lorenz model. The problem stems from the existence of multiple minima for the cost function.

"Assimilation into Ocean Models with Open Boundary Conditions": Keith Thompson (Dalhousie) illustrated the recovery of barotropic shelf circulation using the adjoint method applied to an identical twin problem, and went on to show how the method is being used operationally on the Scotian Shelf. Michael Dowd (Dalhousie) used a variational technique to successfully recover barotropic tidal current fields from acoustic doppler current profiler data. Carlisle Thacker discussed different ways of making the rigid lid approximation in inverse models and argued that the use of a barotropic streamfunction, coupled with a subsurface baroclinic flow, is much less efficient than constraining the total flow to be non-divergent.

The discussion session was spent mainly on the advantages and disadvantages of the various assimilation methods. There was general consensus that present-day computers are inadequate for operational application of the Kalman filter in oceanography and meteorology. On the other hand, the adjoint method of data assimilation holds a lot of promise although the subjective choice of terms that can be added to the cost function to penalize unrealistic model states, and the choice of the model itself, mean that there is a real danger of closely fitting the wrong dynamics to the right data. The use of cross-validation techniques was discussed in this context. The session wound up with the group agreeing on the need for continued communication among researchers, in particular between meteorologists and oceanographers, and recommending a follow-up workshop in a year or so.

Dr. Paul Henri LeBlond

On October 31st, Halloween, the honorary degree of Doctor of Science was awarded to Paul LeBlond at the fall convocation of Memorial University. The following is the oration of Anne S. Stavely that preceded the award.

Mr. Vice-Chancellor:

*Hwæt,
Gesāwon oā æfter wætere wýrmcýnnes feła,
sellice sædracan sund cunnian,
swylce on næshleooum nicras licgean,
oa oñ undermæl oft bewitigao
sorhfulne sīo on segrāde,
wymas ond wildeor.*

This is not an incantation to drive out the eldritch spirits threatening the sanctity of this great mead-hall on this All Hallows' Eve. These are the alliterative measures and metaphors used by the poets of the eighth century to describe the serpents, sea-dragons and wild creatures in their natural world and to record the epic interrelationship of dominance and dependency between humankind and nature.

The northern communities of Europe sang the praises of the great bear-man, the Beowulf, who challenged the potency and mystery of the oceans and its denizens. We here in the eastern community of Canada welcome to our shores, Paul Henri LeBlond, a man who may not look like Beowulf, but who has, in his own way, conquered the seas. Of course, in our post-Newton, Post-Einstein, post-post-modern age, we have mathematics not metaphor, physics not poetic fallacies to make sense of our universe. Paul Henri LeBlond, a leading figure in the quantitative, multidisciplinary science of oceanography uses mathematical symbols to analyse the physical properties of the cosmos. So, although he is now clad in red silk, not the bright armour of an eighth century hero, and, while he may not be prepared to swim the ocean's frigid waters, he has wrestled with the monsters of the ill-defined and the infinite in his life-long study of the potency and mystery of the oceans.

Paul Henri LeBlond has written many scientific articles and co-authored one of the fundamental texts in the study of the oceans: *Waves in the Ocean*. And although his work is not written in the assonantal patterns of Saxon poetry, they have their own resonance and dynamic. If you can interpret the enigmatic language of mathematics, you may read of the undulations of ice burdens, of spiral beaches and solitary waves, of frictional forces in saline seas and of the intriguing coupling between waves and rip-currents. He may not, like Marlowe, have heard madrigals by shallow falls, but he's talked of the propagation in shallow rivers and, like Blake, has found meaning in the wave's patterns and measured the infinite in a grain of sand.

Nor, Mr. Vice-Chancellor, has Paul LeBlond poured scorn on the strange sightings of sea-monsters. Like Beowulf, he has listened to those ancient sailors, recording in scientific articles, though not in song, the known evidence about serpents in Loch Ness, Lake Champlain and Lake Okanagan-those affectionately-named familiars, Nessie, Champie and Ogo-pogo. Paul LeBlond has brought to bear his irreverent intellect on the study of the known and the unknown.

We honour him, today, for his contribution to the study of

oceanography at this university, in Canada and in the international community. Paul LeBlond is one of our prominent scientists, working to overcome the contemporary, and no less gigantic epic monsters of fisheries management and of ocean pollution. His work is central to an understanding of the life-giving dependency between humankind and the natural world. So, Mr. Vice-Chancellor, today, we have welcomed and boasted about this man who has used the authority of his scientific intellect to comprehend the impersonal authority of nature. In so doing, he has extended our understanding of observable life. Ancient communities welcomed, flattered, caroused with, and heaped jewels upon the man who embraced the ocean's streams and defeated the powers that threatened the quality and continuity of life. Surely, we should be no less liberal in our rewards. Of course, budgetary restraints preclude heaping him with rings and crowns, but I would ask you to give him a prize, rich in metaphor - the degree of doctor of science, *honoris causa*.

Med-Met News

Newsletter of the Canadian Medical Meteorology Network

On November 19-20, a very successful Workshop on Weather and Health was held at the National Gallery of Canada, in Ottawa. It was attended by some 80 meteorologists, doctors and members of the healthy care professions. Keynote speakers reviewed the state of knowledge to date and addressed the needs in Canada. The Workshop was sponsored by Environment Canada in collaboration with Health and Welfare Canada and the Canadian Meteorological and Oceanographic Society. The following short article by Denis Bourque (AES) outlines what is meant by "Medical meteorology". It is reprinted from "Med-Met News", the Newsletter of the Canadian Medical-Meteorology Network, Volume 1, No. 1, October 1, 1992.

The creation of a medical meteorology network comes as a natural progression in the development of awareness of the environmental influences on our health. The uniqueness of this network is its restriction to atmospheric factors.

Practitioners with whom we have spoken in the last few years have repeatedly echoed a similar refrain: there are often, amongst their patients, ill-defined ailments which seem suspiciously weather-related. A review of the world-wide literature reveals extensive research has been conducted. It is scattered over 50 years, conducted in many countries and published in many journals and many languages. No good source exists for the exchange and promulgation of the existing knowledge. Nor did we find any existing capability for interested persons to discuss their interests, ideas and research.

It is for these reasons that we have created the **Canadian Medical Meteorological Network**. The Network hopes to unite persons interested in the interaction between meteorology and health.

The Network office address is:-

Canadian Medical Meteorology Network
c/o Dr. John Bart
Bathurst-Steeles Health Centre
6257 Bathurst St., 2nd Floor
Willowdale, Ontario, M2R 2A5
Canada.
Tel. (416)-223-9791 Fax. (416)-229-1450

Technical Conference on Space-Based Ocean Observations

Bergen, Norway, 5-10 Sept. 1993

First Announcement and Invitation:

This "Technical Conference on Space-Based Ocean Observations" is a unique opportunity to build international partnerships for the effective use of satellite-acquired data that are now becoming available to the marine community. The 1990s will witness the most significant change in the observation of the world's oceanic and coastal regions, with new satellite sensors that observe the uppermost levels of the sea's physical and biological characteristics.

The programme will cover all major current and planned oceanic satellites including the ERS series, Cosmos series, Canadian, U.S., Japan, France, China and others. The applications are those observed from satellite altitudes and include both physical and biological measurements.

This meeting is sponsored by the World Meteorological Organization (WMO) and the Intergovernmental Oceanographic Commission (IOC). Other co-sponsors will include the national and international agencies that provide oceanic and marine satellite systems.

All marine scientists, managers, and operators are invited to attend and participate in Bergen, Norway, 5-10 September 1993 at the Hotel Norge.

Goal of the Conference:

The goal of the conference is to foster communications between the users and potential users of space-based oceanic observations and the operators/managers of the remote-sensing systems themselves. This will be accomplished through:

- Examination of the applications of oceanic satellite data to meteorological/oceanographic services, marine modelling for climate purposes, and oceanic environmental monitoring;
- Discussion of operational oceanic satellite data management, including processing, access and delivery to users;
- Elaboration of requirements for validation and ocean-truthing of satellite observations with *in situ* data, and examination of the best mix of satellite and *in situ* data for the preparation of blended products; and
- Development of training requirements for marine satellite data collection, management, and applications.

Abstracts of 250 words or less are due by 1st Oct. 1992.

Registration fees are due by 1st June 1993. Financial support, on a limited basis, may be available. Advanced registration for the Conference is US\$200 if paid by 1 June 1993, and US\$250 thereafter.

Further information:

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Volume 30 No 4 December 1992 Décembre

ATMOSPHERE-OCEAN

Tropospheric low-level temperature inversions in the Canadian Arctic. J. Kahl, M.C. Serreze & R.C. Schnell.

Tropospheric variations in the turbidity of the Arctic atmosphere in Russia. V. Radionov and M. Marshunova.

On the interannual variability of Arctic sea-level pressure and sea ice. S. Power and L. Mysak.

Sea-ice and wind: Effects on primary production in the Barents Sea. E. Sakshaug and D. Slagstad.

Propagation of coastal trapped waves under an ice cover in Hudson Bay. T. Reynaud, R.G. Ingram, H.J. Freeland and A.J. Weaver.

Measurements of drifter cluster dispersion. Badal K. Pal and Brian G. Sanderson.

International Congress on Modelling and Simulation University of Western Australia 6-10 December, 1993

This Congress incorporates the 10th Biennial Conference of the Modelling and Simulation Society of Australia, Inc. MSSA Inc. (formerly, SSA Inc.) is an affiliate of the International Association for Mathematics and Computers in Simulation (IMACS).

The MSSA Inc. is an interdisciplinary society which aims to promote, develop and assist in the study and practice of all areas of modelling and simulation in Australia.

There is an emphasis on applied problems. Many of its members work on environmental, agricultural and socio-economic methods and applications. Hence, it is natural that the Congress be a joint meeting with the Society for Ecological Modelling (ISEM) and the International Environmetrics Society (TIES), as well as with IMACS,

There will be four Presidential and five Keynote Addresses. These and many of the parallel sessions of contributed papers will focus on areas of common interest to the international societies and participating Australian societies.

Abstracts due March 8, 1993. Full papers due Aug 2, 1993. For further information and registration forms contact Tony Jakeman, CRES, Institute of Advanced Studies, Australian National University, Canberra ACT 2601, Australia.
Tel: 61-6-249-4742 Fax: 249-0757
E-Mail: tony@cres.anu.edu.au

**THE THIRD INTERNATIONAL CONFERENCE
ON SCHOOL AND POPULAR
METEOROLOGICAL AND OCEANOGRAPHIC EDUCATION**

The conference will focus on two themes: the function of meteorology and oceanography in the formal science education of students, especially in the K-12 grades and the education of the general public in making effective use of the services and products provided by national environmental services and the media. The hosting organization is the Canadian Meteorological and Oceanographic Society and the co-sponsors are the Royal Meteorological Society, the American Meteorological Society and the World Meteorological Organization.

The conference is open to anyone involved in general (non-specialist) meteorological or physical oceanographic education at either the school or adult level. Information on the various topics that have been covered in the past can be found in either Weather Education, Proceedings of the First International Conference on School and Popular Meteorology (Royal Meteorological Society, 1985) or Preprints of the 2nd International Conference on School and Popular Meteorological and Oceanographic Education (American Meteorological Society, 1989) or you may contact Sheila Bourque, chairperson of the Local Arrangements Committee at the address below, for a list of the titles presented at the two conferences.

The conference itself will be a mixed format, with poster displays, oral presentations of papers and "hands-on" demonstrations of equipment and teaching aids. In addition, there will be an exhibition of resources for teachers. Presentations in any of these formats are currently being solicited on the following topics:

1. K-12 educational programs in meteorology and oceanography for science or geography classes;
2. Uses of technology to promote meteorological and oceanographic education - micro-computers, electronic bulletin boards, television and radio, visual aids etc.; and
3. Popular adult education on topics in meteorology and oceanography, including media.

The deadline for submission of abstract is December 30th, 1992. Abstract and descriptions should not exceed 500 words and authors should indicate the preferred format (oral or poster). All correspondence relating to program should be addressed to Dr. Steven B. Newman, Department of Physics and Earth Sciences, Central Connecticut State University, New Britain, CT 06050 USA. (Tel: 203-827-7248: Fax: 203-827-7877: e-mail (BITNET): NEWMAN@CTSTATEU.BITNET). All enquiries related to Local Arrangements should be addressed to Sheila Bourque, Chairperson, Local Arrangements Committee, c/o Canadian Meteorological and Oceanographic Society, P.O. Box 334, Newmarket, Ontario L3Y 4X7 (Tel: 416-739-4220: Fax: 416-739-4700).

Call for Papers

1st International Conference on Computer-Aided Learning (CAL) and Distance Learning in Meteorology, Hydrology and Oceanography

5-9th July 1993, Boulder, Colorado

The First International Conference on Computer Aided Learning (CAL) and Distance Learning in Meteorology, Hydrology and Oceanography (CALMet), sponsored by the World Meteorological Organization and the American Meteorological Society will be hosted by UCAR's Cooperative Program for Operational Meteorology, Education and Training (COMET). It will be held at the Clarion Harvest House in Boulder Colorado, 5-9 July 1993.

The theme for this first conference is "Getting it Right." The aim of the conference is to bring together meteorologists, educators, administrators, instructional technologists, and others who have an interest in the application of distance learning and computer-based learning technologies. This will be the first conference of its kind and will seek to stimulate ongoing and future activities which will benefit the international meteorological, hydrological and oceanographic communities.

The conference will consist of workshops, formal presentations, and displays of hardware and software by a variety of commercial vendors. The first two days will offer a series of workshops led by experts in their subject areas. Workshops currently planned are: *The Fundamentals of CAL and Multimedia*; *Using Effective Instructional Designs in CAL*; *Taking the Myth Out of Authoring Systems*; and *Evaluating CAL Projects*.

The remaining three days will be devoted to the presentation of papers from invited speakers and submitted papers which will include development and assessment techniques as well as examples of the use of computer technology in education and training. Sessions will focus on these themes: steps needed to get into CAL; educational strategies and learning experiences appropriate for CAL; using CAL in operational settings; using CAL technologies in the traditional classroom setting; and others. All presentations will be given in English only.

Titles, abstracts (approximately one page, single spaced) should include the author's name(s), affiliation, telephone/fax/email numbers. Abstracts should be submitted no later than 1 February, 1993, to the conference co-chairperson, Dr. Charles Duncan, Professor of Meteorology, Edinburgh University, King's Buildings, Edinburgh EH9 3J2, United Kingdom (Tel: 44.31.650.5091; Fax: 44.31.662.4269; email: C.Duncan@ed.ac.uk). Abstracts may be submitted by email in ASCII format. Authors of submitted papers are encouraged to contribute to a postprint volume. Instructions will be provided at a later time.

For further information, interested persons are encouraged to contact either of the two Program Co-chairpersons: Charles Duncan (see above) or Brian Heckman, Manager, Distance Learning Program, Cooperative Program for Operational Meteorology, Education and Training (COMET), UCAR, P.O.Box 3000, Boulder, Colorado. (Tel: (303)-497-8498; Fax: (303)-497-8491; Internet heckman@comet.ucar.edu or Omnet b.heckman).

Air-Sea Interface Announcement and Call for Papers

radio and acoustic sensing, turbulence and wave dynamics
Marseilles, June 24-30, 1993

Announcement

A symposium on the Air-Sea Interface will be held in Marseilles, France, 24th-30th June 1993. This meeting will be along the lines of the very successful meetings in Miami (1981) and Sendai (1984), which dealt with the mechanics of the air-sea interface and the application of remote sensing techniques in this field. The symposium will be convened by Mark Donelan, of the National Water Research Institute, Canada Centre for Inland Waters, Dr. Alfred Ramomonjarisoa of the Institut de Mécanique Statistique de la Turbulence, Université d'Aix-Marseille and Prof. Kristina Katsaros of the University of Washington and the Institut Français de la Recherche pour l'Exploitation de la Mer.

Objectives

The causes and evolution of climatic change are among the principal scientific issues today. The interaction between oceans and atmosphere is a vital link in the dynamics of climate variation. From the very small scales of near-surface boundary layers, to the global variation of ocean surface properties, to wind and wave distributions, there is much to be explored via theory and observations. Today the advanced development of radio and acoustic remote sensing techniques complements the more traditional *in situ* methods and greatly increases the excitement of, and possibilities for, learning more about the boundary layers that join atmosphere and ocean and that are vital in the regulation of our weather and climate.

This symposium is the third in a series dealing with the mechanics of the boundary layers on both sides of the air-sea interface and with the application of remote sensing techniques in this field. The previous symposia were directed primarily at wave dynamics and the upper ocean mixed layer and the related use of electromagnetic remote sensing methods. This symposium widens the scope to acknowledge the coupling of air and water boundary layers and the increasing prominence of acoustic methods for observing the interface and probing the boundary layers from above and below.

Abstracts

A 500 word (maximum) camera-ready abstract, including title, author's name(s) and affiliation(s), must be sent by mail (not fax), before the end of November, 1992, to:

Dr. Michael Skafel
National Water Research Institute
Canada Centre for Inland Waters
Box 5050
Burlington, Ont. L7R4A6 Canada

ACCREDITED CONSULTANTS/EXPERTS-CONSEIL ACCREDITES

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

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

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

La présente section est réservée aux experts-conseils accrédités de la SCMO. Le processus d'accréditation a débuté en décembre 1986. Une liste complète des experts-conseils accrédités de la SCMO peut être obtenue au bureau d'affaires de cette dernière. Les personnes désirant l'accréditation doivent entrer en contact avec la Société à son bureau de Newmarket afin de recevoir une copie de règlements et un formulaire d'application.

Comme il est indiqué dans le document intitulé "Règlements de la SCMO pour l'accréditation", les critères d'adhésion sont:

- (1) L'applicant doit posséder un diplôme universitaire de premier cycle approprié d'une institution reconnue.
- (2) L'applicant doit posséder au moins un des types suivants de formation spécialisée.
 - (i) diplôme de deuxième ou troisième cycle en météorologie ou océanographie d'une université reconnue;
 - (ii) diplôme de deuxième ou troisième cycle en sciences naturelles ou appliquées ou en mathématiques avec spécialisation dans une ou plusieurs branches de la météorologie ou de l'océanographie d'une université reconnue; ou
 - (iii) trois années d'expérience sur le marché du travail en météorologie ou en océanographie.
- (3) En plus des exigences d'éducation et de formation, l'applicant doit posséder au moins deux années d'expérience sur le marché de travail, avec un rendement satisfaisant, dans le champ de spécialisation mentionné dans le document. De l'expérience en tant qu'expert-conseil est nécessaire.

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

Bill Thompson, CCM
CMOS Accredited Consultant
Impact assessments, Hydrometeorology, Aviation Meteorology
Forest Fire Suppression, Marine Meteorology

Wm. C. Thompson & Associates Ltd.
112 Varsity Green Bay N.W.
Calgary, Alberta T3B 3A7, Canada
Tel: (403)-286-6215

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Mory Hirt

*CMOS Accredited Consultant
Applied Aviation & Operational Meteorology*

*Meteorology and Environmental Planning
401 Bently Street, Unit 4
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Tel: (416) 477-4120 Telex: 06-966599 (MEP MKHM)*

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*KelResearch Corporation
850-A Alness Street, Suite 9
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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*

You could have your business card here!

Douw G. Steyn

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

*4064 West 19th Avenue
Vancouver, British Columbia V6S 1E3 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*

R.B.B. Dickison

*CMOS Accredited Consultant
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Agrometeorology, Hydrometeorology, Forest Meteorology*

*Atlantic Weather & Environmental Consultants Ltd.
112 Bloor Street
Fredericton, New Brunswick E3A 2K4 Canada
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Mike Lepage, M.S.

*CMOS Accredited Consultant
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Air Pollution Meteorology, Climate Research*

*Rowan Williams Davies & Irwin Inc.
650 Woodlawn Road West
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For records only: if student, please indicate institution and year studies will be completed.

Pour dossiers seulement: l'étudiant(e) doit inscrire le nom de son institution et l'année où il (elle) finira ses études.

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PRIMARY FIELD OF INTEREST - SPHERE D'INTERET PRINCIPALE

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Hydrology
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Agriculture et foresterie

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Météorologie d'exploitation

Floating Ice
Glaces flottantes

Mesoscale Meteorology
Météorologie à la mésoéchelle

Fisheries Oceanography
Océanographie des pêches

Other (specify)
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December/Décembre 1992 Vol. 20 No. 6

See over/voir au verso

