



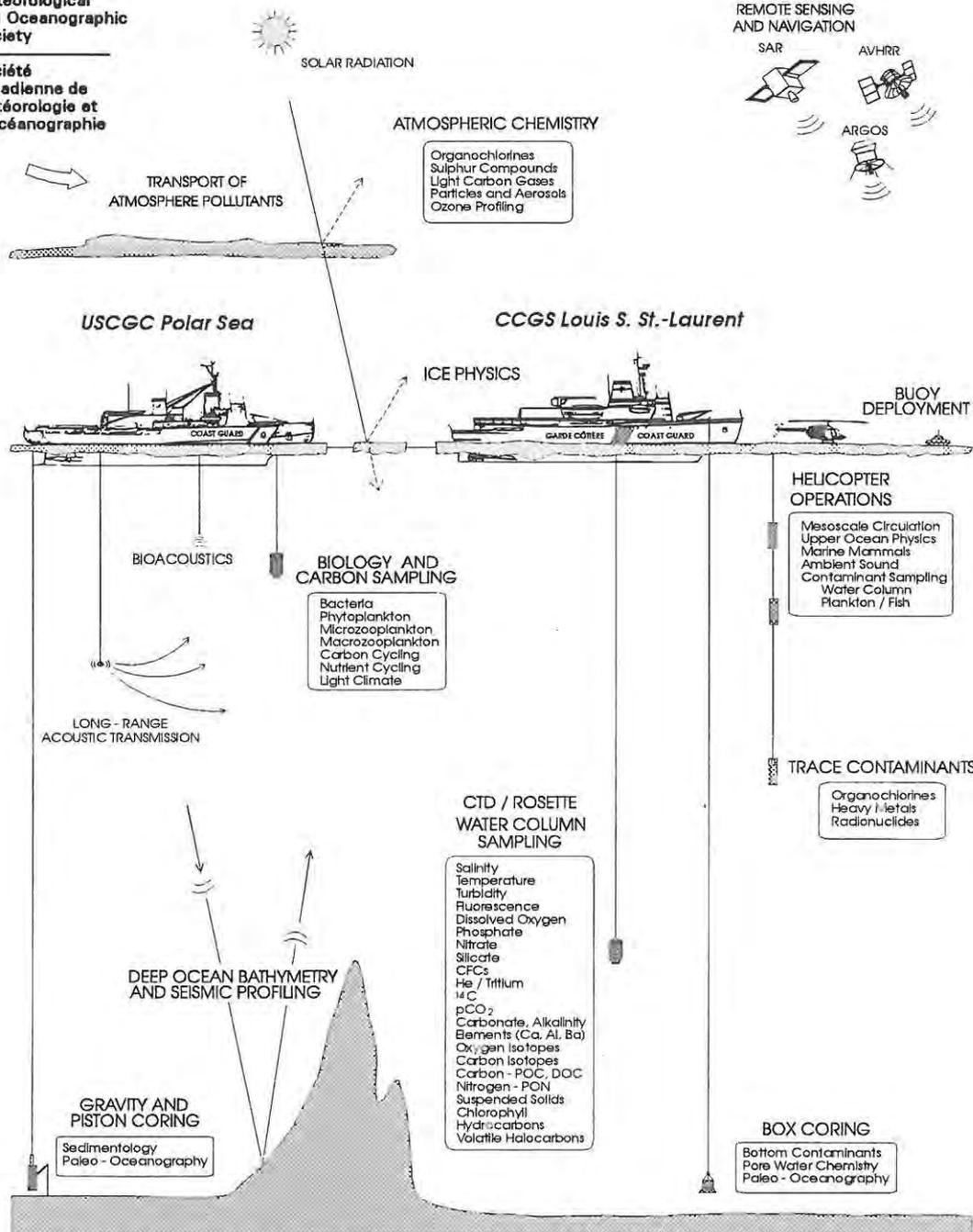
C.M.O.S. NEWSLETTER

NOUVELLES S.C.M.O.

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Canadian
Meteorological
and Oceanographic
Society

Société
canadienne de
météorologie et
d'océanographie



1994 ARCTIC SECTION EXPEDITION

The Arctic Transect Expedition to take place in 1994 is an integral part of ACSYS, Arctic Climate Systems Science. An outline of IOS activities under ACSYS is outlined beginning on page 7.

EDITOR'S COLUMN

The next issue of the CMOS Newsletter 21(3), June 1993, will go to press on May 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

What's Going Around? by Savonius Rotor

The greatest accolade in the English language is the adoption of a person's name into the language with a lower case first letter. Thus we have recognized the achievements of Lord Chesterfield, Lord Sandwich and Sir Thomas Crapper, to name only three. The scientific world has been exceedingly generous in recognizing in our system of units the achievements of such luminaries as Albert Einstein, Isaac Newton and Claude Émile Jean-Baptiste Litre. Today I would like to bring to your attention the somewhat lesser known achievements of George Edward Fathom.

Fathom was born in Whitby in 1716, the same year that Litre was born, and was raised to expect a future as a seaman. His father and grandfather had both served as "leadsman" in the Royal Navy and so little George Fathom followed the family tradition at the age of 12. Fifteen years later Fathom was involved in the first major survey of water depths around the isle of Ely. At that time water depths were measured by lowering a stout cord on which a lead weight was attached. Knots were tied at regular intervals and the leadsman counted the number of knots passing through his hands as the line fell to the bottom. By this time Fathom had deduced the importance of tying knots at very regular intervals and devised a mechanical device that could tie these knots with an accuracy of 1 part in 1000. After that it was a small step to mass produce standard lead lines that could be installed on all ships of the navy. At a stroke depth surveys from two different ships were now comparable! Fathom's knots had a

standard separation of about 2 of the royal yards as standardized by Henry VIII. Fathom was appointed cordmaster of the Navy in 1760. In 1763 he published his major written work "Cogitatae Profundae" and in 1764 was elected a Fellow of the Royal Society. A set of standard cords was deposited with the Society archivist, but these were destroyed during an ill fated attempt by Fellows to climb Big Ben following the annual Christmas party in 1790.

Fathom never knew of the demise of his standard cords, he had died in 1780. Two hundred years after his death few countries in the world used the fathom on nautical charts, Canada being one of the few. At the present time all new charts prepared in Canada ignore the achievements of George Edward Fathom.

Ice Reconnaissance/Patrol Charity Fund

Past and present members of Environment Canada, A.E.S., Ice Reconnaissance/Patrol, Ottawa, have re-established a non-profit charity trust fund to mark the 35th anniversary of Arctic Operations.

The fund was originally established in the early 70's at a Grey Cup party at Frobisher Bay, and was also assisted by Headquarters Officers.

During early 1992 a Board of Trustees was appointed and commenced fund raising by the sale of shirts and caps with the Ice Patrol logo. The seven-person Board of Trustees selected R.S. Bob Zacharuk, Chief-Ice reconnaissance, as Chairman, W.F. Bill Ganong agreed to serve as Honourary Chairman.

The first grant will be dispatched to the senior nursing officer, Iqaluit Hospital, who will manage funds for discharged Inuit newborn babies for initial home supplies. Goals are to include funds for similar purposes to Inuvik and Resolute.

For additional details contact Bob Zacharuk by phone, fax or mail at the Ice Centre, Lasalle Academy, Ottawa. The fund is a registered charitable foundation. Support to date has been by current colleagues, but friends from the last 35 years in the scientific community and private sector are invited to contribute.

T. B. Kilpatrick
Oakville, Ont.

The Executive Director Needs Help

The following letter has been received by Uri Schwarz:-

"Dear Sir:

Can you send me information on if and how do people affect weather? and how can I stop it. I'm doing some research.

Thank you
Signature"

If you think you can help by answering this query, please contact Uri Schwarz at (613)-990-0300 for further information.

BC wave is nearly a world record

Jim Gower, Inst of Ocean Sciences

Winter on the BC coast can be rough, but oceanographers and weather forecasters still need their numbers. Buoys have the advantage that they stay out and collect data in the important "high energy" conditions that send ships running for cover. This means that they meet some pretty large waves. The plot below, produced by Robin Brown (Inst. of Ocean Sciences), shows the December data from the AES/DFO buoy deployed 40 n.m. west of Dixon Entrance. Wave heights are calculated from accelerations sensed inside the buoy, so the wave-measuring device can be well protected. Winds can only be measured by an exposed propeller, which in this case failed to survive the arrival of the 85 ft giant. As Robin pointed out "One wave like that could ruin a fisherman's[†] whole day."

46205 - West Dixon Entrance DEC 1992

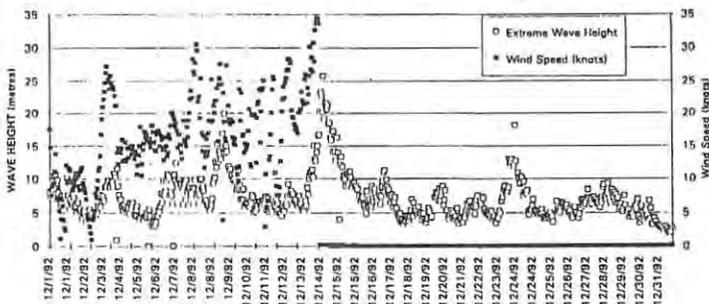


Figure 1: Plot of wind and "extreme" wave data (i.e. trough to next crest height) from the AES/DFO buoy off Dixon Entrance for the month of December 1992. The anemometer broke and gave a "zero" reading after the buoy was swamped by a giant, 26 metre (85 ft) wave in the third of a series of storms last December.

My 1970 edition of the Guinness Book of World Records gives 75 ft as the highest wave measured by an instrument (as against 112 ft from a "reliable" human observer (hah!)). The latest edition gives 86 ft from a weather-ship measurement in the Atlantic in 1972. We seem to have been beaten to a record by one foot (this time), but the narrow margin shows that our waves are definitely "world class." On the strength of this, the IOS librarian has agreed to purchase the Guinness Book to keep an eye on possible future records for IOS. We already have the Nakwakto Rapids listed.

IOS has been contributing to the installation and maintenance of data buoys off the west coast. These are deployed in a network of 3 offshore and 11 coastal locations, measuring temperatures, winds and waves. This year's winter storms have damaged 3 of the buoys and broken the moorings of another two. One is still adrift. Two others have developed other problems. IOS now plans to contribute ship-time and money to catch the drifting one, make repairs and re-deploy them all. And go for the record wave.

† According to a recent DFO publication, this word, though "sexist", is acceptable because of the clumsiness of alternatives.

WOCE News

Announcement of Research Opportunity

The WOCE field program is currently underway, and will result in an unprecedented global ocean physical oceanographic data set. At present, a number of ocean circulation modelling programs are also underway. CNC-WOCE anticipates a need to interpolate these data sets, compare data sets with models, and test the predictions of models against observations. We wish to encourage development and testing of techniques useful for combining observations and models (often termed data assimilation techniques). Subject to the availability of funds for a two-year pilot project beginning July 1994, and subject to overall WOCE project developments, CNC-WOCE would request proposals from researchers in Canadian Universities dealing with the assimilation of ocean circulation models and observations. Collaborative projects which will support the training of students in this emerging field are encouraged.

Interested parties are requested to send a 1-page planning letter to Barry Ruddick, Dept of Oceanography, Dalhousie University, (woce@open.dal.ca, Fax: 902-494-2885) by May 25. CNC-WOCE will give feedback within a month, particularly with respect to the availability of funds and whether a full proposal is requested. If such a project is to be initiated, the proposal deadline will be Sept. 1, 1993.

All proposals must explain in detail how the work proposed will contribute to WOCE objectives and will network with international WOCE activities. Detailed milestones of work to be performed must be provided. Proposals will be reviewed internally by CNC-WOCE, and then be peer reviewed internationally, before funding decisions are made by CNC-WOCE.

New CMOS Members

The following new members were approved at the CMOS Executive meeting 12th February, 1993:

Michel Béland	Montréal, QC	(régulier)
Sylvie Bergeron	Regina, SK	(regular)
Ryan Blackmore	Edmonton, AB	(student)
Rodney Bradford	Mont Joli, QC	(regular)
Clifford Chu	Halifax, NS	(student)
Dwight Clarke	Regina, SK	(regular)
Mark Coté	Regina, SK	(regular)
William Forster	Ft. Smith, NWT	(regular)
Dennis Fudge	Mississauga, ON	(regular)
Michel Gosselion	Rimouski, QC	(régulier)
William Hyde	Halifax, NS	(regular)
Daniel Robitaille	Montréal, QC	(étudiant)

Note to Centres and Chapters:

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

GEWEX News

A total of 28 proposals were received from government laboratories as a result of the Call for Proposals for Green Plan funded GEWEX research in January 1993. Proposals were received from Atmospheric Environment Services (AES) laboratories at Downsview, Dorval, Edmonton and Saskatoon, the National Hydrology Research Institute in Saskatoon, and Indian and Northern Affairs in Yellowknife. The total funding requested is approximately \$1 million for FY93/94. The proposals indicated other funding sources contributing approximately \$1 million from government A-base and more than \$1 million from other outside sources for FY93/94. The GEWEX Science Committee will meet in Saskatoon on March 8 and 9, 1993, to discuss and evaluate the proposals and make its recommendations to the GEWEX Management Committee for allocation of approximately \$230,000 available from the Green Plan for FY93/94.

Also in January, letters of intent were received from 12 universities, including: Dalhousie, Québec INRS-EAU, McGill, McMaster, Waterloo, Ottawa, Saskatchewan, Alberta, and British Columbia; proposing projects for the GEWEX - NSERC Collaborative Special Project and Program (CSPP) grant application. The Canadian GEWEX Science Committee will be reviewing letters of intent to identify obvious overlaps or gaps, leading to a more focused set of proposals. Principal investigators have been requested to submit full proposals to the Canadian GEWEX Secretariat by March 1, 1993. All proposals will be sent for external review and the Application for the CSPP Grant will be developed by the Science Committee, in consultation with the Principal Investigators and the Canadian GEWEX Management Committee. The CSPP Grant application will be submitted to NSERC in July 1993. The total funding requested by PIs, through their letters of intent, is about \$2 million per year. We expect to submit an application with recommended funding of \$1.2 to \$1.5 million per year, for three years, with the likelihood of a follow-on funding request for 1997 onward.

Science Panel for the GEWEX Continental-Scale International Project (GCIP) Meetings in Vicksburg, Mississippi.

Rick Lawford, attended the GCIP Science Panel meeting in Vicksburg, Mississippi on November 10 to 12, 1992. The following paragraphs give an overview of the GCIP plans and a summary of the discussions held at the Science Panel meeting.

The GEWEX Continental Scale International Project (GCIP) is a component of the World Climate Research Program's Global Energy and Water Cycle Experiment (GEWEX). It is designed to provide detailed information about water and energy budgets over an extensive geographical area of the Earth. The following objectives have been established for GCIP:

- 1) to determine the time/space variability of the hydrological and energy budgets on a continental scale,
- 2) to develop and validate macroscale hydrological models, related high resolution atmospheric models, and coupled hydrological/atmospheric models,
- 3) to develop and validate information retrieval schemes incorporating existing and future satellite observations coupled with enhanced ground-based observations,
- 4) to provide a capability to translate the effects of future

climate change into impacts on water resources on a regional scale.

After a review of watersheds around the globe, the International GEWEX Scientific Steering Committee chose the Mississippi River Basin as the focus for this study. Subsequently a science panel was established and a number of workshops and meetings have been held to develop the concept. The Vicksburg Science Panel meeting was another step in this process. The Panel heard reports from various working groups and from related projects and programs. Related programs include:

PILPS - a project headed by Dr. Ann Henderson-Sellers which provides for an intercomparison of land process parameterization schemes for GCMs.

BALTEX - a GEWEX project being developed by European scientists to examine the relationships between climatic parameters over Europe, the hydrology of the European rivers, and the freshwater flux into the North Sea.

GCSS - a GEWEX project involving the study of cloud systems in different regions of the world.

US Weather Research Program - a program planned for the central US with an extensive field program beginning in 1995.

ARM - a world-wide network of atmospheric radiation measurement sites including a detailed observational site in Oklahoma.

GPCP - the global precipitation climatology project led by Dr. Phil Arkin (NOAA).

MAGS - the Mackenzie GEWEX study which is one of the main focal activities of the Canadian GEWEX program,

LATEX - a project to observe meteorological and oceanographic conditions over the Gulf of Mexico.

GCIP planning is progressing well in the areas of atmospheric sciences and data. Progress in the hydrology area is also being made although many questions remain about the best way to integrate hydrological and atmospheric models. The discussions emphasized the need for the GCIP program to carry out retrospective analysis and model development activities as well as field campaigns to obtain high resolution data. The enhanced GCIP observing period will begin in 1995. In order to facilitate the retrospective analysis, a GCIP Data Management and Services System will be set up to manage specialized GCIP data sets and to direct GCIP scientists to those agencies which maintain data bases useful in GCIP research. As a result of the discussions at Vicksburg, a portion of the GCIP implementation plan was for presentation to the GEWEX Scientific Steering Group in February 1993.

Although intensive GCIP field activities are scheduled to begin in 1995, many other activities have already been initiated. Data bases are being assembled and plans developed for atmospheric and hydrologic modelling studies. Historical analyses are being undertaken with new high resolution atmospheric models to obtain better data sets for subsequent water and energy budget analyses.

R. Lawford, Chief, Hydrometeorological Processes Division, AES Saskatoon (tel. (306) 975-577)

JGOFS Canada an overview

The Canadian JGOFS program was officially launched in February of 1992 with approval of funding from the Natural Sciences and Engineering Research Council of Canada[†]. The program represents 22 projects and more than 50 scientists in universities and government laboratories across Canada, and encompasses a range of physical, biogeochemical and paleoceanographic studies of the natural cycles of biogenic materials. In addition to studies in the Equatorial Pacific and pelagic North Pacific and North Atlantic Oceans, the Canadian program features a wide range of field studies along the Pacific and Atlantic Canadian continental margins and in the Gulf of St. Lawrence.

While the birth of the national program does herald an increased commitment to the JGOFS effort, this event did not mark the beginning of Canadian involvement in JGOFS. Canada has had strong representation during development of the international program and Canadian research groups have been an important part of many international field studies. These projects that were initiated for the international effort are now an integral part of JGOFS Canada and provide a strong link with the international program.

Canadian JGOFS is a national program composed of a series of process studies that are designed to fill identified gaps in knowledge in areas in which there is strong Canadian interest and national expertise. The Canadian JGOFS program has identified three themes in which Canadian research can support the goals of JGOFS. These include: (I) gas exchange, (II) transformations and transport within the ocean and (III) processes leading to burial at the sea floor.

The first of these, gas exchange, is devoted to producing a better understanding of CO₂ transfer velocity as a function of environmental parameters. Specific projects within this theme will: measure CO₂ flux directly using eddy correlation methods; determine N₂ and O₂ fluxes from gas inventories derived from gas tension and O₂ measurements in the water column; measure bubble populations and near-surface fluid dynamical processes using acoustical techniques; and study white cap coverage. Results of collaborative experiments among groups in this theme are intended to assist in the JGOFS goal of estimating CO₂ fluxes from δpCO_2 measurements and remotely sensed parameters.

Theme II within JGOFS Canada will focus on understanding the processes that influence transport of carbon from the surface layers of the ocean to the ocean interior. This includes physical transport of inorganic carbon and the export of biologically fixed carbon via the biological pump. Collaborative efforts involving multidisciplinary field studies, detailed studies of specific processes and mathematical modelling will be employed to study the 4 issues that have been identified in this theme:

(1) Oceanic total and new production: studies at a range of oceanic sites will be directed toward determining the rates of total and new production and understanding the factors controlling these rates. A further objective is to develop

techniques for extending these process-oriented results to the large scale to accomplish the JGOFS goals. Remote sensing is one such technique, and one in which there is both strong Canadian interest and expertise.

(2) Trophic transformations in the mid-water column: Specific projects within JGOFS Canada will study how biological production in the upper ocean is modified as it passes through the mid-water column to depth. In particular, these studies will examine the influence of the structure of the pelagic food web on the resultant flux of organic carbon and nitrogen from the photic zone. This includes assessing the degree of recycling within the microbial loop in the context of its importance in the export budget.

(3) Physical processes and carbon fluxes into the oceans interior: Direct measurements of the export of carbon from surface to deep waters will be linked to measurements of physical processes including turbulence, deep water formation, upwelling and coastal jets.

(4) Physical - biogeochemical modelling of the carbon cycle: A variety of modelling techniques will be used to extend results of process studies to spatial and temporal scales that are consistent with the objectives of JGOFS.

Research in theme three will consist of two types of studies. The first will focus on processes that affect and control burial and regeneration of carbon and associated nutrient elements in recent sediments. Particular emphasis will be placed on continental margins as regions of global importance in the removal and regeneration of organic carbon. The second type of study will be directed toward understanding oceanographic controls on burial of carbon in Quaternary sediments. These paleoceanographic studies will examine the relationships between variations in carbon burial and extant climate and oceanographic conditions inferred from proxy indicators, e.g., stable isotope variations in foraminifera and organic matter and chemical and mineralogical composition of the sediments.

Members of the Canadian national program met in Montréal October 28-29 to describe recent scientific advances and to discuss plans pertaining to core measurements and data management. This meeting demonstrated that the Canadian national program is well on its way and that a strong spirit of collaboration exists within themes and across theme boundaries. Through collaboration the Canadian program will maximize the suite of JGOFS core measurements while at the same time addressing the specific issues identified in the national plan. The result should provide an important contribution to the international JGOFS effort.

For additional information please contact Dr. Bruce Johnson, Executive Director for JGOFS Canada, JGOFS Canada Secretariat, Dept. of Oceanography, Dalhousie University, Halifax, Nova Scotia, Canada B3H 4J1. Tel. (902)-494-3557 or Fax (902)-494-3877

[†] Additional support has been provided by DFO, AES and DEMR.

Climate Change News

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

6 ka B.P. Paleoclimate Workshop:

In late-November 1992, members of the Canadian climate modelling and paleo-proxy communities met in Ottawa to discuss and plan options for research under the Paleoclimate-Model Intercomparison Project (PMIP). The three day workshop was organized by the Geological Survey of Canada (GSC) and jointly sponsored by the GSC, Canadian Climate Centre and the Royal Society of Canada.

The Ottawa workshop dealt specifically with the 6 ka B.P. time slice, one of several being tested under the PMIP. The main objective of the meeting was to examine ways that the paleo-proxy people holding 6 ka data might begin to work with the Canadian modellers in their model intercomparison activities. It was clear from the discussions that an important first step was for the paleo-proxy group to develop a cross-Canada 6 ka synthesis incorporating all available data, including those which were more qualitative in nature. H. Jetté and her colleagues at GSC have started this effort and presented results of a preliminary 6 ka vegetation map for Canada.

The meeting helped establish a working relationship between Canadian climate modellers and paleo-proxy workers. Plans are now being drafted for a multi-year collaborative research project which will deal with the 6 ka period and a number of other time slices of interest to both groups. This project will represent a multi- sectoral consortium involving scientists from Canadian Universities, the GSC, the Canadian Climate Centre and other government agencies. The project will meet and respond to the objectives set out by several international global change programs.

An abstract volume of the presentation made at the meeting will be published by the Royal Society in 1993. It is intended to publish a more ambitious, multi-authored, peer-reviewed book on the Canadian 6 ka paleo-environment in 1994. It is expected that this document will represent a baseline for future work in Canada. The GSC will be organizing several regional workshops as a follow-up to the 6 ka workshop. These are designed to establish contact and solicit advice from researchers unable to attend the Ottawa meeting. These workshops are scheduled to be held in 1993 and early 1994, and will cover all regions of Canada. Anyone interested in being involved in these workshops or desiring further information on the collaborative project should contact John Matthews (613-996-6371) or Hélène Jetté (613-992-0581) Ottawa.

Up-Coming Climate-Related Research Meetings in Canada:

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.

Newsletter Advertising Rates

Rates are based on black and white camera-ready copy. Sizes (inches) are full page (7.5 x 9.5), half-page single column (3.5 x 9.5), half-page two-column (7.5 x 4.5) and quarter page (3.5 x 4.5). Other charges will apply when typesetting, artwork or photography are required. **Material for inclusion in the CMOS Newsletter should be sent directly to the editor.** Distribution is to CMOS members, and therefore is approximately 1000 for each issue. There are six issues per year and appear in February, April, June, August, October and December.

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Arctic Climate System Study (ACSYS)

RESEARCH AT THE INSTITUTE OF OCEAN SCIENCES RELEVANT TO THE SCIENTIFIC GOALS OF THE ARCTIC CLIMATE SYSTEMS (ACSYS) PROGRAM SUMMARY OF ACSYS OBJECTIVES

The WCRP - Arctic Climate System Study (ACSYS) arises from, and seeks to answer, two linked questions:

- Is the Arctic climate as sensitive to global change as present models suggest?
- Does the Arctic system have a strong effect on global climate?

These questions arise from a variety of observational and modelling results; specifically, we know:

- Deep water formation in the north polar regions provides the major completion of one part of the ocean's thermohaline circulation; often termed the "conveyor belt". In turn, the rate of deep water formation is regulated by the export of fresh water products from the Arctic Basin.

- Sea ice formation in the Arctic affects both deep water formation and albedo feedbacks to the atmosphere.

- Coupled atmosphere-ice-ocean models are consistent in showing the strongest temperature increase following a CO₂ doubling in the Arctic. Some models show a shut down of the conveyor belt, producing radical global change.

While there is evidence that the Arctic is strongly linked to global climate, we still do not know:

- Whether the models are correct, since they misrepresent much of the physics of the system and do not resolve important ocean current systems and convective processes.

- Whether the Arctic Ocean can, indeed, affect global climate, or whether its size and heat content are simply too small to affect the global circulation pattern.

- How important changing Arctic conditions will be to the oceanic uptake and storage of greenhouse gasses such as carbon dioxide and methane.

Accordingly, the scientific goal if ACSYS is to ascertain the role of the Arctic hydrosphere in global climate; five key activities for focused, multidisciplinary research are cited; these are:

- (1) Atmospheric Forcing
- (2) Ocean Circulation
- (3) The Water Cycle
- (4) Sea Ice
- (5) Climate Modelling

IOS RESEARCH RELEVANT TO ACSYS OBJECTIVES

The scale and multidisciplinary nature of Arctic climate research require an international, rather than national, effort.

As part of the Canadian contribution to the international ACSYS program, a number of activities at IOS, past, on-going and proposed, are identified below (also, see Figure 1).



Figure 2 Locations of IOS research activities in the Arctic.

These activities combine field studies of both physical and geochemical distributions, and broadly-based modelling experiments. This outline is organized to follow the research identified by the ACSYS Scientific Steering Committee (SSC) as relevant to understanding the Arctic's role in climate change.

1. ATMOSPHERIC FORCING

The goal of this work is to acquire, organize, and analyze all available atmospheric data for Arctic regions for use as forcing parameters in coupled ice-ocean modelling experiments.

A. Measurement Data Base

ACSYS Objective - to compile and analyze data bases of existing atmospheric data (pressure, temperature, wind velocity, and radiative fluxes) from 1979 to present.

ACSYS (Cont.)

IOS Activities Past and Present

- A compilation has been made of meteorological (temperature, pressure, wind, cloud cover) data for the Beaufort Sea region (Carmack, Macdonald; NOGAP Funded).
- As a member of the International Arctic Buoy Program (IABP), IOS provides deployment opportunities for ARGOS buoys recording atmospheric pressure, air temperature, and ice drift (Perkin, Melling; PERD Funded).

IOS Activities Planned

- A climatology of atmospheric forcing, suitable for modelling, will be constructed (Carmack, Macdonald; NOGAP Funded).
- Participation in the IABP will continue (Perkin, Melling; PERD Funded).

B. Re-Analysis

ACSYS Objective - to make use of operational weather forecasting models, combined with real observations, to formulate a more representative surface forcing data set, and to formulate more accurate parameterizations of atmospheric forcing.

IOS Activities Past and Present

- From the difference between observed and numerically modelled surface temperatures, air-sea and ice-sea fluxes of heat have been estimated (Eby, Holloway; ONR Funded)

IOS Activities Proposed

- Statistical modelling of the co-evolution of ice cover and atmospheric variables will be carried out using historical data (Holloway, Flato; PERD Funded).

2. OCEAN CIRCULATION

The goal of this work is to arrive at an understanding of the modern ocean circulation, its forcing, and its interaction with the world ocean thermohaline circulation. Four sub-areas are identified.

A. Historical Data Base

ACSYS Objective - to construct data bases of existing oceanographic data (Temperature, Salinity, Oxygen, and Nutrients) from all available sources.

IOS Activities Past and present

- A data base system based on a commercial package has been configured for general oceanographic data, and available historical data from North American and European sources entered (Perkin; IOS A-Base Funded).
- IOS maintains the Arctic Data Compilation Project (ADCAP) in the Canadian Arctic: this comprises the primary reference for existing oceanographic measurements in the Canadian Arctic and the Canada Basin (Melling, Smiley, Macdonald, Lake; PERD, IOS A-Base Funded).
- A data base of statistical summaries of ocean current measurements in the southern Canada Basin and the Canadian Arctic is maintained (Melling; PERD Funded).

IOS Activities Planned

- The ACSYS Scientific Steering Committee has identified

IOS as the principal contact to arrange oceanographic data exchange with the Russian Arctic and Antarctic Research Institute in St. Petersburg (Perkin, Lake; IOS A-Base Funded).

- IOS will continue efforts to maintain and update oceanographic and imagery data bases (Melling, Smiley, Perkin, Funding not identified).

B. Ocean Sections

ACSYS Objective - to obtain a coherent description of the physical and geochemical structure of the Arctic Ocean, based essentially on the model of WOCE lines.

IOS Activities Past and Present

Over the past decade IOS has been involved in a number of international and interdisciplinary studies of ocean circulation, including:

- The Fram IV Ice Camp north of Fram Strait in (1980; Perkin, Lewis, IOS A-Base Funded).
- The CESAR expedition to Alpha Ridge (1983; Perkin, Lewis; IOS A-Base, PCSP Funded).
- CTD surveys north of the Queen Elizabeth Islands from the PCSP Ice Island (1988-89; Perkin, Lewis; IOS A-Base, PCSP Funded).
- SOFAR underwater acoustically tracked float measurements in the Southern Canada Basin (1990-91; Perkin, A-Base Funded).
- CTD surveys of the Northwind Ridge area of the Canada Basin (1992; Perkin: IOS A-Base, USCG Funded).
- Annual wintertime oceanographic sections across the continental margin of the southern Canada Basin (1979-92; Melling; PERD Funded).
- Annual summertime oceanographic section work across the continental margin of the Southern Canada Basin to obtain both physical (CTD, currents) and geochemical (nutrients, oxygen, CFCs, delta-18, other tracers) relevant to describing and modelling circulation. This work is part of a cooperative program with the Canadian Coast Guard (1989-92; Macdonald, Carmack; NOGAP Funded).

IOS Activities Planned

IOS will participate in major section work planned as a contribution to ACSYS Section work; specifically:

- A cruise in 1993 (Chukchi - East Siberian Shelf Section) aboard the CCGC Henry Larsen (Macdonald, Carmack, NOGAP Funded).
- A joint Canadian/American cruise in 1994 (the TransArctic Section) aboard the CCGC Louis S. St. Laurent; Carmack, Perkin, Macdonald; Green Plan Funding Requested).

C. Ocean Monitoring

ACSYS Objective - to obtain records on annual and interannual time scales of ice and ocean properties relevant to global change.

ACSYS (Cont.)

IOS Activities Past and present

- An examination of variability and co-variability of ocean properties, ice, and weather based on 4 decades of historical data has been completed (Melling; PERD Funded).
- Since 1979, IOS has carried out annual (late winter) oceanographic surveys of the Beaufort Sea. The ACSYS SSC recognizes this effort as a model for future shelf monitors in the Arctic (Melling; PERD Funded).
- Ocean currents at mid-shelf and shelf-break have been monitored almost continuously since 1985. Since 1990, the program has utilized doppler sonars which provide current observations over much of the water depth and, in addition, ice motion (Melling; PERD Funded).
- IOS has carried out sediment trap deployments to measure the vertical flux of carbon and related particles at the shelf break, and in the southern Canada Basin (1987-88, 1990-92; Macdonald, Carmack; NOGAP Funded).
- IOS, in cooperation with the University of Washington, designed and deployed the prototype Arctic Climate Mooring to measure currents, ice thickness and carbon flux in the southern Canada Basin in 1990. The ACSYS SSC recognizes this effort as the prototype Arctic Ocean Climate Station (1990-92; Carmack; Macdonald; NOGAP Funded).

IOS Activities Planned

- IOS will continue to carry out wintertime CTD surveys of the Beaufort Sea (Melling; Funding not identified).
- IOS will maintain the Arctic Ocean Climate Station in the Canada Basin through 1996 (Carmack, Macdonald; PERD and Green Plan Funded).
- IOS will continue shelf-break current monitoring in the Beaufort Sea using doppler sonars through 1996 (Melling; PERD Funded).

D. Shelf Processes

ACSYS Objective - to ascertain the role of continental shelves in the basin wide circulation, distribution of oceanographic properties, and carbon cycle. Specific areas identified for research are (a) The Beaufort Shelf (For process studies on variability, geochemical sources and sinks and cross shelf exchange); (b) The Chukchi Shelf (For an understanding of exchange with waters of Pacific origin); and (c) The Barrents and Kara Seas (For an understanding of exchange with waters of Atlantic origin and shelf drainage).

IOS Activities Past and Present

For almost two decades, work at IOS has focused on process studies of the Beaufort Shelf. These include on-going studies of:

- Baseline work on currents, waves and the distribution of physical properties during both summer and winter was carried out (1974;75; Herlinveaux, Giovando; Beaufort Sea Project Funded).
- Circulation and interannual variability and co-variability of oceanographic conditions (1980 to Present; Melling, Topham; PERD Funded).
- Estuarine exchange processes on the Mackenzie Shelf/estuary; in particular techniques of water mass

analysis using geochemical distributions (delta-18, nutrients) are being applied to understand the sources and disposition of fresh water types on continental shelves (1986 to present; Macdonald, Carmack; NOGAP Funded).

- Bottom distributions of methane have been measured to evaluate the stability of methyl hydrate to altered water temperatures (1974-75; Macdonald; Beaufort Sea Project Funded).
- Pore water profiles of nutrients (nitrate, silicate, phosphates) have been measured to evaluate processes which re-inject nutrients back into the water column and biological cycle.
- The influence of submarine canyons on shelf-break circulation (1989 to Present, Carmack, Foreman, Macdonald; NOGAP Funded).
- Shelf-slope currents are being modelled in ways that include the effects of subgridscale eddy-topography interaction (1989 to Present; Holloway, Eby; ONR Funded).

IOS Activities Planned

- Field work in the Beaufort on shelf processes and exchange with the ocean interior are planned to continue through 1996 (Melling, Topham, Pite, Macdonald, Carmack, Foreman, Henry; PERD, NOGAP, Green Plan Funded).
- A combined physical/geochemical cruise aboard the CCGC Henry Larsen to the Chukchi - East Siberian shelf region is planned for summer, 1992 (Macdonald, Carmack; NOGAP, PERD Funded).

3. WATER CYCLE

A. Runoff Data

ACSYS Objective - to obtain an accurate record of fresh water inputs to the Arctic Ocean. This entails compiling stream flow data from all available sources, and intercomparing gauging methodologies used by different agencies.

IOS Activities Past and Present

- A three year study of streamflow in an ice covered river (Yukon River) was carried out (1983-86; Carmack. DOE A-Base Funded).
- A fresh water budget for the Arctic Basin and adjacent seas was compiled from all available sources, and published as part of a conceptual model on the role of the Arctic in climate change (Carmack; NOGAP Funded).

IOS Activities Planned

- IOS will facilitate exchange of hydrologic data on streamflow in Russian Rivers, and work on methods intercomparison for estimating flow in ice covered rivers (Carmack; Green Plan Funding Requested).
- An estimate of riverine water storage in ocean basins will be carried out using historical data (Carmack, Berger-North; Green Plan Funding Requested).

B. Precipitation Data

ACSYS Objective - to compile and re-analyze existing data on precipitation in the Arctic, extend the measurement network to more accurately represent continental, coastal, and

ACSYS (Cont.)

oceanic domains, and to develop new measurement methodologies

IOS Activities - Nil

C. Hydrologic (Empirical) Models

ACSYS Objective - to develop, and verify hydrological models for both gauged and ungauged river systems.

IOS Activities Past and Present

- From the difference between observed and numerically modelled ocean surface salinities, fluxes of fresh water (including runoff) have been estimated (Eby, Holloway; ONR Funded)

4. SEA ICE

A. Ice Export

ACSYS Objective - to understand to interaction between ice export from the Arctic Basin and convection in Arctic seas; in particular, the sensitivity of ice export to atmospheric forcing, ice thickness, and seasonality.

IOS Activities Past and Present

- Observational data have been compiled to examine the relationship between ocean stratification and ice extent (Carmack, Macdonald, Perkin; IOS A-Base).

IOS Activities Planned

- Modelling efforts are being made to improve the advective representation of sea ice in climate models (Flato).

B. Ice Climatology

ACSYS Objective - to obtain a climatology of ice extent, thickness, and drift for both shelf and oceanic domains.

IOS Activities Past and Present

- Since 1979, data on the thickness of first-year ice in late winter in the offshore Beaufort Sea have been collected (Melling; PERD Funded).
- A digital archive of NOAA satellite views of the Beaufort Sea, suitable for ocean and ice studies, has been created and now spans over a decade (Melling, Smiley; PERD Funded).
- Since 1990 data on ice thickness, underside topography and motion has been collected using upward looking sonar (ULS) and remote sensing on the Beaufort Shelf (Melling; PERD Funded).
- Since 1990 data on ice thickness has been collected using a deep-moored ULS in the Canada Basin (Carmack, Macdonald; NOGAP Funded).

IOS Activities Planned

- On going measurement programs will be continued through 1996, and data made available to the Acsys scientific community (Melling, Carmack; PERD, Green Plan Funded).
- Observations of ice thickness, topography, and motion by sonar will be established in the pack west of the Canadian Archipelago (Melling; Funding not identified).

C. Forcing

ACSYS Objective - to determine and parameterize the coupling between wind, currents, and ice.

IOS Activities Past and Present

Studies have been carried out since 1980 on the drag exerted by stratified flow under ice topography, including:

- Field studies which have provided detailed information on the underice topography of heavily ridged ice, and have shown the strong control of the local flows by internal wave systems (Topham, Melling; PERD Funded).
- Laboratory experiments have been conducted which have demonstrated the substantial contributions to drag on ice keel features due to internal wave generation (Topham, Pite; PERD Funded).
- Theoretical studies have been initiated for the interpretation of both field and laboratory experiments (Topham, Pite; PERD Funded).
- A field study of the dynamics moving pack ice in the Beaufort Sea, including measurements pertinent to all forcings, was conducted in 1989 (Melling, Topham; PERD Funded).

IOS Activities Planned

- Field work will continue with the use of bottom mounted acoustic instrumentation developed for the long-term monitoring of under ice flow and biological activity (Topham, Pite; PERD Funded).

D. Processes Controlling Ice Thickness Distributions

ACSYS Objective - to acquire observational data on the spatial ice thickness distribution for selected regions of the Arctic applicable to modelling the dynamics and thermodynamics of ice-ocean interaction.

IOS Activities - Nil

5. MODELLING

A. Ice-Ocean Interaction

ACSYS Objective - to develop models which explore the physics of ice and ocean interaction.

IOS Activities Past and Present

Modelling efforts at IOS have explored a wide range of physical problems applicable to the ACSYS goals listed above, including:

- Investigation of advective schemes with particular attention to better treatment of the ice edge (Flato; PERD Funded).
- A model of flow under an ice keel has been developed to refine estimates of ice-water drag (Cummins; PERD Funded).
- A Multilevel ice description is being implemented in basin scale simulations to improve the calculation of thermodynamic growth by better resolving thickness variability (Flato; PERD Funded).

IOS Activities Planned

- A key emphasis in future modelling work is ice-ocean coupling, insofar as this affects upper ocean temperature and salinity structure interactive with ice thermodynamic evolution (Flato, Holloway, Eby; ONR Funding Requested).
- Development of a sea ice component which is both dynamic and thermodynamic, and which is computationally efficient (Holloway, Flato; ONR Funding Requested).

ACSYS (Cont.)

- Biogeochemical tracers will be introduced to the ocean modelling to (a) evaluate fluxes, such as carbon, through the system, and (b) improve the physical oceanographic model based on tracer observations (Holloway, ONR Supported).
- A one-dimensional model of the seasonal and interannual cycle of fresh water on continental shelves (Omstedt, Carmack, Macdonald; NOGAP Funded).

B. Inclusion of the Arctic in Coupled GCMs

ACSYS Objective - to develop models which use the appropriate physics to couple the atmosphere, ice, and ocean, and link the Arctic in an accurate fashion to coupled GCMs.

IOS Activities Past and Present

- Three-dimensional circulation modelling has been initiated for (a) a Canadian Basin bounded at the Lomonosov Ridge, and (b) a complete Arctic coupled to the Atlantic, and (c) the global ocean inclusive of the Arctic (Eby, Holloway; ONR Funded).

IOS Activities Planned

- Within the larger scale modelling, a new facility is being developed to support the embedding of fine scale modelling within the coarser grid model (dynamic zoom). This process will be iterated to achieve very high resolution to estimate local impacts of larger scale climate change, and improve the representation of smaller scale processes (Holloway, Eby; ONR Funded, IOS A-Base Requested).
- Expanded 3D circulation modelling of the Canadian Basin will utilize geochemical tracers and dynamic zoom to better understand special areas such as the Mackenzie River discharge (Holloway, Eby; not identified funding).
- Effort will be directed toward collaboration with AES scientists and with colleagues worldwide in coupling interactive atmospheric models with ocean-ice models (Holloway, Eby, Flato; not identified funding).

1992 Huntsman Award

The 1992 Huntsman Award was received on February 24th, 1993 by Dr. Trevor Platt, the 15th recipient of that Award. Named after Archibald Gowanlock Huntsman (1883-1972) the A.G. Huntsman Award was created to honour men and women of any nationality who significantly influence the course of marine research. Dr. Platt's work has spanned more than 20 years and most recently he has applied his knowledge of marine optics and of plankton physiology to the interpretation of satellite images of the sea surface. This analysis forms a critical part of JGOFS, the Joint Global Ocean Flux Study. Trevor Platt was the CMOS Tour Speaker in 1988.

UQAR
AUX DIMENSIONS
D'AUJOURD'HUI



Professeure ou professeur régulier en chimie inorganique de l'environnement marin

Le Département d'océanographie de l'Université du Québec à Rimouski sollicite des candidatures pour combler immédiatement un poste de professeur régulier en chimie inorganique de l'environnement marin. La personne retenue devra obligatoirement posséder un Ph. D. ou D. Sc. en océanographie chimique, chimie ou discipline connexe, avec une expérience post-doctorale et une solide expérience de recherche. Elle sera appelée à collaborer aux programmes de recherche multidisciplinaires existants et/ou à élaborer et développer de nouveaux projets de recherche liés à la chimie inorganique de l'environnement marin.

Le titulaire de ce poste dispensera des activités d'enseignement dans sa discipline au niveau des études avancées (maîtrise et doctorat) en océanographie et sera appelé à diriger des étudiants gradués. Il sera aussi appelé à donner des cours de premier cycle dans les domaines reliés à sa compétence.

La personne retenue pourra être intégrée au Centre océanographique de Rimouski regroupant présentement plus de 25 chercheurs de l'UQAR et de l'INRS-Océanologie. Ce centre comprend également près de 70 étudiants de 2^e et 3^e cycles, des stagiaires, des chercheurs doctoraux ainsi que des professionnels. Les recherches entreprises au nouveau Centre porteront sur l'étude des milieux marins côtiers, plus particulièrement sur les interactions entre les composantes physiques, biologiques, chimiques et sédimentologiques de ces systèmes.

La langue de travail est le français.

TRAITEMENT: Selon la convention collective en vigueur. Selon la loi canadienne, la préférence est accordée aux citoyens canadiens et aux immigrants reçus. Toute candidature sera traitée confidentiellement. Les intéressés doivent faire parvenir leur curriculum vitae ainsi que les noms, adresses et numéro de téléphone de trois références, avant le 3 mai 1993, à:

Monsieur Mohammed I. El-Sabh, directeur
Département d'océanographie, Université du Québec à Rimouski
310, allée des Ursulines, Rimouski (Québec) Canada G5L 3A1
Téléphone: 1-418-724-1770 Fax: 1-418-724-1842



Université du Québec à Rimouski

Corrections Notice to all Members

In accordance with By-Law 7(b), I am giving notice that the Annual General Meeting of the Society will be held on Tuesday June 8th, 1993 at the CMOS Congress. The meeting room and exact time will be posted at the registration desk. This meeting will include these items listed under By-Law 7(c):

1. To receive and consider the reports of the council, the Auditor, the ballot counters, the Committees, the Centres, the Chapters, the Editorial boards, and the Special Interest Groups;
2. To approve the annual budget of the Society;
3. To establish the membership fees for the next calendar year;
4. To discuss and determine such other questions as may be proposed relating to the affairs Society; and
5. To install new officers for the ensuing year.

The agenda for the Annual General Meeting will be published in the Annual Review which will be mailed to all members before the Annual General Meeting. In accordance with By-Law 10 (e) of the Canadian Meteorological and Oceanographic Society, I am providing you with:

1. The list of members of the current Council;
2. A list of nominations for 1993/94 made by the nominating committee; and
3. Notification that nominations for Council will be received in accordance with By-Law 10(d).

The Council for 1992/93 consists of:

President	Dr. D. Krauel
Vice-President	Dr. G. McBean
Treasurer	Dr. S. Tabata
Recording Secretary	Dr. H. Melling
Corresponding Secretary	Mr. D. Bancroft
Past President	Dr. L.A. Hobson
Councillors-at-large	Dr. R. Leduc Dr. G.K. Sato Dr. D. Daugharty

The Council nominations for 1993/94 consist of:

President	Dr. G. McBean
Vice-President	Dr. J. Derome
Treasurer	Dr. S. Tabata
Recording Secretary	Dr. H. Melling
Corresponding Secretary	Mr. D. Bancroft
Past President	Dr. D. Krauel
Councillor-at-large	Mr. M. Hawkes Dr. G.K. Sato Dr. D. Daugharty

Douglas Bancroft
Corresponding Secretary

Corrections Avis a tous les membres

Conformément au règlement 7(b), je donne l'avis que l'assemblée générale annuelle de la Société aura lieu mardi le 8 juin, 1993. La salle et l'heure de l'assemblée seront affichées au kiosque d'inscription. Cette assemblée traitera les points contenus dans l'Article 7(c), qui sont:

1. L'acceptation et la prise de connaissance des rapports du conseil, des vérificateurs, des préposés au dénombrement des votes, des comités, des centres, des sections, des conseils de rédaction, et des groupes d'intérêts spéciaux;
2. L'acceptation du budget annuel de la Société;
3. La détermination des montants de la cotisation pour la prochaine année;
4. La discussion et la résolution de questions soulevées se rapportant aux affaires de la Société; et
5. L'investiture des administrateurs pour la prochaine année.

L'ordre du jour pour l'assemblée générale annuelle sera publiée dans la revue annuelle qui sera envoyée à tous les membres avant la rencontre annuelle. Selon les termes de l'article 10(e) des règlements de la société canadienne de météorologie et d'océanographie, je vous fais parvenir:

1. La liste des membres du Conseil en cours;
2. La liste des mises en candidature pour 1993/94 telle que rédigée par le Comité des mises en Candidature; et
3. Notification que les mises en candidature pour le conseil seront reçues selon les termes de l'Article 10(d).

Le Conseil pour 1992/93 se compose comme suit:

Président	Dr. D. Krauel
Vice-président	Dr. G. McBean
Trésorier	Dr. S. Tabata
Secrétaire d'assemblée	Dr. H. Melling
Secrétaire correspondant	Mr. D. Bancroft
Président Sortant	Dr. L.A. Hobson
Conseillers	Dr. R. Leduc Dr. G.K. Sato Dr. D. Daugharty

Mises en candidature pour le Conseil de 1993/94:

Président	Dr. G. McBean
Vice-président	Dr. J. Derome
Trésorier	Dr. S. Tabata
Secrétaire d'assemblée	Dr. H. Melling
Secrétaire correspondant	Mr. D. Bancroft
Président Sortant	Dr. D. Krauel
Conseillers	Mr. M. Hawkes Dr. G.K. Sato Dr. D. Daugharty

Douglas Bancroft
Secrétaire correspondant

CHANGES TO CONSTITUTION AND BY-LAWS

Preamble

Council is proposing two amendments to the By-Laws this year. The first amendment is a series of typographical corrections and wording changes to improve the clarity and grammar of the By-Laws. The second is an amendment to By-Law 10 - Election of Council. The proposed change is in response to suggestions from members, who feel that all members should have a vote in the election of the Society's officers. The amendment will enable the election of Council to occur by mail ballot rather than at the Annual General Meeting, which not all members are able to attend. It should be noted that Article 5 of the constitution currently enables changes to the Constitution and By-Laws to be voted on by mail ballot. The proposed amendment will enable the election of Council to occur in a similar manner with participation by all members.

In accordance with Article 5.a) of the CMOS Constitution, these proposed amendments are published. They will be considered at the 27th Annual General Meeting.

-
- BY-LAW 1 j** Amend to read: "Any member may resign from the Society by submitting a written resignation to the Society".
- BY-LAW 5 a** Sentence 1: change "In locations" to "In a location" and the "discussion of" to "discussing".
- BY-LAW 6 a** Sentence 2: change "co-located" to "collocated".
- BY-LAW 6 c** Second line: change "area" to "areas".
- BY-LAW 7 a1** Change first two words "Annual Congresses" to "An Annual Congress".
- BY-LAW 9 c** Sentence 1: Change "comprise" to "are contained in".

BY-LAW 10 - Election of Council

- b** Line 1: change "elected" to "installed".
- c** Line 1: change "By February 1" to "By January 1".
- d** Line 1: change "By March 1" to "By February 15".
- e** Lines 2 and 3: change "up to 75 days before the Annual General Meeting" to "up to March 15".
- e** (iii): change "signed by four members" to "signed by nine members".
- f** Delete and replace by: "If there is more than one nomination for any office, voting will occur by mail ballot either by inclusion in the Newsletter or by letter to each member of the Society. Ballots will be mailed to each member at least 60 days before the Annual General Meeting.
- g** Delete and replace by: "Ballots received no later than one week before the Annual General Meeting will be counted by the Recording Secretary and a scrutineer appointed by Council. Winner(s) will be decided by a simple majority. In the event of a tie, a coin will be tossed to determine the winner. Results of the ballot will be announced at the Annual General Meeting.
- BY-LAW 12** Last 4 lines: replace by "eligible members present at duly convened meetings of the bodies which elected or appointed them, after the Officers concerned had been given an opportunity to express their views."
- BY-LAW 14 b** Sentence 2: change "of Council meetings" to "of a Council meeting".

APPENDIX III

- Memberships 1.** Change sentence 1 to "Committees and Editorial Boards are to inform the Vice-President by February 1 of the new members/chairmen they nominate as replacements of outgoing members/chairmen (periods of appointment start and end on July 1)."

Last sentence, last 2 lines: change to read: "copies to the Chairmen of the Committees or Editorial Boards."

CHANGEMENTS - CONSTITUTION ET RÈGLEMENTS

Préambule

Le Conseil propose deux modifications aux règlements cette année. La première modification consiste en une série de corrections typographiques et de changements de vocabulaire dans le but de clarifier les règlements et d'en améliorer la grammaire. La seconde modification concerne le règlement 10 - Élection du Conseil. Le changement proposé répond à une suggestion des membres, qui voudraient que chacun d'eux puisse avoir le droit de vote à l'élection des dirigeants de la Société. La modification permettra de faire l'élection du Conseil par bulletin de vote postal plutôt qu'à la réunion générale annuelle, à laquelle tous les membres ne peuvent se rendre. Veuillez noter que l'article 5 de la présente constitution permet de modifier la constitution ou les règlements par bulletin de vote postal. La modification ici proposée permettra que l'élection du Conseil se déroule de façon semblable avec la participation de tous les membres.

En accord avec l'article 5.a) de la constitution de la SCMO, les modifications ci-dessus proposées sont publiées. Elles seront discutées lors de la 27^e réunion générale annuelle.

RÈGLEMENT 3 c Remplacez «programme des résumés» par «programme et résumés».

RÈGLEMENT 6 a Ligne 8 : Enlevez «domaineparticulier» et remplacez par «domaine particulier».

RÈGLEMENT 8 e Ligne 3 : Enlevez «etcelui» et remplacez par «et celui».

RÈGLEMENT 10 - Élection du Conseil d'administration

c Lignes 2 et 3 : remplacez «le premier février» par «le premier janvier».

d Ligne 2 : remplacez «le premier matin tard» par «le 15 février au plus tard».

e Lignes 1 et 2 : remplacez «jusqu'à 75 jours avant la tenue de l'assemblée générale annuelle» par «jusqu'au 15 mars».

f Enlevez et remplacez par :
«Si plus d'une personne est proposée pour un poste, on procédera à un vote par correspondance soit en incluant le bulletin de vote dans le *Bulletin de nouvelles* ou par lettre à chaque membre de la Société. Les bulletins seront envoyés à chaque membre au moins 60 jours avant l'assemblée générale annuelle.»

g Enlevez et remplacez par :
«Les bulletins reçus au plus tard une semaine avant l'assemblée générale annuelle seront comptés par le secrétaire d'assemblée et un scrutateur nommé par le conseil d'administration. Le(s) gagnant(s) seront décidés par simple majorité. Dans le cas d'égalité, la personne gagnante sera choisie par pile ou face. Le résultat des votes sera annoncé lors de l'assemblée générale annuelle.»

RÈGLEMENT 11 Titre : remplacez «de bureau» par «du bureau».

RÈGLEMENT 11 a Lignes 2 et 3 : remplacez «directeur, commercial des publications de la SCMO» par «directeur, publications SCMO».

RÈGLEMENT 11 b Ligne 2 : remplacez «directeur commercial des publications» par «directeur, publications SCMO».

RÈGLEMENT 12 Titre : remplacez «de bureau» par «du bureau».

Ligne 1 : remplacez «du» par «de».

Ligne 2 : remplacez «comités» par «conseils».

Ligne 8 : remplacez «élus» par «élu».

Ligne 9 : remplacez «designés» par «désignés».

RÈGLEMENT 13 Lignes 1-4 : Enlevez et remplacez par «A l'exception du directeur exécutif, du directeur, publications SCMO, et du président et des membres du comité d'accréditation, tous les autres membres de la Société, comprenant le».

RÈGLEMENT 14 d Ligne 4 : remplacez «affaire» par «affaires».

CHANGEMENTS - CONSTITUTION ET RÈGLEMENTS

- RÈGLEMENT 14 d** Ligne 4 : remplacez «affaire» par «affaires».
Ligne 6 : remplacez «des» par «de».
- RÈGLEMENT 14 e** Ligne 3 : remplacez «comité» par «comités».
- RÈGLEMENT 15 b** Ligne 3 : remplacez «seront basés» par «sont basés».
- RÈGLEMENT 15 c** Ligne 1 : remplacez «de» par «le».
Ligne 3 : remplacez «avec» par «ainsi que».
- RÈGLEMENT 16 a** Ligne 7 : remplacez «professionalisme» par «professionnalisme».
- RÈGLEMENT 17 a** Ligne 1 : remplacez «fiscale» par «financière»
- RÈGLEMENT 18** Ligne 4 : remplacez «fiscale» par «financière».
- APPENDICE II** Ligne 4 : remplacez «tel que suit» par «les suivantes».
- a 3. Ligne 1 : Remplacez «préside aux» par «conduit les».
 - 4. Ligne 1 : Remplacez «préside» par «conduit».
 - c 3. Ligne 2 : Remplacez «montants» par «sommés».
 - e 3. Titre suivant ce paragraphe : remplacez «de bureau désignés sont tel que suit» par «du bureau désignés sont les suivantes».

APPENDICE III

Mandat 1. Ligne 5 : remplacez «Lequel» par «Ce dernier».

POLITIQUES COURANTES DE LA SCMO

Ligne 1 : remplacez «annuelle générale» par «générale annuelle».



Meteorological Instruments



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27th ANNUAL CMOS CONGRESS Fredericton, 7-11 June, 1993

The 27th Congress will be held at the University of New Brunswick from the 7th to the 11th of June. UNB is Canada's oldest university and combines with the small-town atmosphere of Fredericton to give a pleasant venue. The scientific program will cover a wide range of topics of current and special interest from all of the fluid earth sciences.

Scientific Program

Four Theme Sessions will be featured:

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

Special Sessions are also being planned on

Canadian Hazards (a contribution to IDNDR)
CASP II
Hydrological Cycle at Regional & Global Scales
WOCE
Modernizing Canada's Weather Services
Tracers in the Ocean
Oceanography of Seamounts & Banks
Ozone and the Ultraviolet.

In addition, the program will be complemented by a variety of papers in other areas of meteorology and oceanography. Theme and Special Sessions will feature invited speakers.

The deadline for abstracts for oral and poster papers is January 29, 1993. For information contact Dr. John Loder, Chairman, Scientific Program, at: 902 426 4960, Fax: 902 426 7827.

Registration

Registration details, and a form can be found elsewhere in this Newsletter. Early registration is a great help to the Congress organizers. Contact David Daugharty or Ardith Armstrong at: 506 453 4501, Fax: 506 453 3538.

Accommodation

Participants should make their own reservations. Blocks of rooms have been reserved at three locations:

UNB Residence System. Rates: \$27.30 single, \$39.90 twin (these are current rates and there may be a small increase for next summer). Reservations can be made by contacting UNB Housing & Food Services; at: 506 453 4891, Fax: 506 453 3585.

Lord Beaverbrook Hotel. Located on the banks of the Saint John River, 15 minutes walking distance from the University. Rates: \$68 single, \$71 double. At: 506 455 3371, Fax: 506 455 1441.

Sheraton Inn. Also on the bank of the Saint John, but 15 minutes by cab from the University. Rate: \$79. At: 506 457 7000, Fax: 506 457 4000.

Our reservation at the hotels will only be held until three weeks before the Congress, so be sure to act in good time.

27e CONGRES ANNUEL de la SCMO Fredericton, 7-11 juin, 1993

L'Université du Nouveau Brunswick sera l'hôte du 27e congrès de la SCMO qui se tiendra à Fredericton du 7 au 11 juin 1993. UNB est la plus ancienne université au pays. Cette caractéristique rehaussée par l'ambiance chaleureuse de la petite ville de Fredericton en fait un endroit privilégié. Le programme scientifique couvrira une gamme de sujets d'actualité et d'intérêts spéciaux couvrant toute les sciences traitant des fluides de la terre.

Programme scientifique

Quatre sessions seront au programme:

Modélisation Climatique
Météorologie Agricole et Forestière
Interaction Physique-Biologique dans l'océan
Télédétection

Des sessions spéciales sont également prévues pour:

Danger au Canada (contribution d'IDNDR)
CASP II
Cycle Hydrologique à l'échelle régionale et globale
l'ECOM
La modernisation des services météorologique au Canada
Les traceurs dans l'océan
Océanographies des montagnes et bancs
Ozone et la radiation ultra-violette

En plus, le programme sera accompagné par une variété de présentation dans d'autre domaine de la météorologie et de l'océanographie. Des personnes ont également été invitées pour des sessions spéciales.

La date limite pour soumettre les résumés des présentations orales et les affiches est le 29 janvier 1993. Pour plus d'information, contacter Dr. John Loder, responsable, Programme Scientifique à: 902 426 4960, Fax: 902 426 7827.

Enregistrement

Les détails pour l'enregistrement ainsi que les formulaires sont inclus ailleurs dans cette brochure. Un enregistrement aussitôt que possible serait apprécié par les organisateurs. Contacter David Daugharty ou Ardith Armstrong à: 506 453 4501, Fax: 506 453 3538.

Accommodation

Les participants doivent faire leur propre réservation. Un nombre de chambres a été réservé aux trois endroits suivants:

Résidence UNB. Taux: \$27.30 simples, \$39.90 double (Ceux-ci sont les taux actuels, il peut y avoir une légère augmentation pour l'été prochain). On peut réserver en contactant UNB Housing & Food Services; à: 506 453 4891, Fax: 506 453 3585.

Lord Beaverbrook Hotel. Situé sur la rive sud de la rivière Saint Jean à 15 minutes de marche de l'université. Taux: \$68.00 simples, \$71.00 double. à: 506 455 3371, Fax: 506 455 1441.

Sheraton Inn. Également sur la rive sud de la rivière Saint Jean à 15 minutes de taxi de l'université. Taux: \$79.00. à: 506 457 7000, Fax: 506 457 4000.

La réservation des chambres aux différents établissements sont valides jusqu'à trois semaines avant le congrès, soyez certain d'agir en temps.

Travel to Fredericton

Air Canada has been appointed the Official Airline for our Congress in Fredericton. Save up to 50%, pending availability, with minimum guaranteed savings of 15% on the full Hospitality and Executive class services.

To take advantage of the above savings, please call your travel agency or Air Canada at 1-800-361-7585. When purchasing your ticket, please ask that our event number **CV930362** be entered in the Tour Code box, and reference code **CMOS** in the Endorsement box regardless of the fare purchased.

CMOS benefits from these bookings, receiving one free ticket for every 40 tickets purchased; these can be used for invited speakers, or to support student attendance.

Industrial Exhibitors

The cost of an exhibit booth is \$650. This includes taxes and registration for all events for two persons. Reservations should be made before April 1. Contact Leo Burns at: 506 458 3022, Fax: 506 458 4390.

Be sure to quote the Air Canada event number (CV930362) for a 25% discount in Air Canada Cargo rates.

Sponsorships

Businesses or organizations interested in sponsoring any activity (a coffee break, for example), or in publishing advertisements in the program should contact David Daugharty at: 506 453 4501, Fax: 506 453 3538 for details on rates.

Business Meetings

Committees, SIGS, etc. will have an opportunity to schedule business meetings on Monday, June 7th. Chairs should contact David Daugharty to establish times and locations.

Se rendre à Fredericton

Air Canada a été désigné comme transporteur officiel pour le congrès à Fredericton. Economisez jusqu'à 50%, dépendant de la disponibilité, une économie minimum garanti de 15% sur le service hospitalier et exécutif.

Prenez avantage de ces économies; contacter votre agence de voyage ou Air Canada à 1-800-361-7585. Lorsque vous achetez votre billet, demandez que notre numéro d'événement **CV930362** soit inscrit dans la case "tour code", et le code de référence CMOS dans la case de l'endossement, peu importe le tarif d'achat.

La SCMO bénéficie de ces réservations; recevant un billet gratuit pour tous les 40 billets achetés, ces billets peuvent être utilisés pour les invités spéciaux ou pour venir en aide aux étudiants désireux d'assister au congrès.

Exposants industriels

Le coût d'un kiosque est de \$650. Ce montant inclus les taxes ainsi que l'enregistrement à tous les événements pour deux personnes. Les réservations doivent parvenir avant le 1e avril. Contacter Leo Burns à: 506 458 3022, Fax: 506 458 4390.

Soyez certain de mentionner le numéro d'événement (CV930362) pour un rabais de 25% sur les tarifs d'Air Canada.

Commanditaires

Les entreprises ou organisme intéressés à commanditer une activité (pause café par exemple) ou en publiant une annonce commerciale dans le programme doivent contacter David Daugharty à: 506 453 4501, Fax: 506 453 3538 pour les détails concernant les tarifs.

Rencontre d'affaire

Les comités tels; SIGS, etc auront la chance d'établir la cédule des rencontres d'affaire le lundi 7 juin. Les responsables sont priés de contacter David Daugharty pour déterminer un endroit et le temps de la rencontre.

Volume 31 No 2 June 1993 Juin

ATMOSPHERE-OCEAN

as of 20th Jan/en date de jan 20

A study of a CASP storm: Analysis of radar data.
I. Zawadski, P. Zwack and A. Frigon.

Retrieval of the microphysical properties in a CASP storm by integration of a numerical kinematic model.
Isztar Zawadski, Luc Ostiguy and J.P. René Laprise

Coastally trapped stratus events in British Columbia.
C.J.C. Reason and R. Dunkley.

Simultaneous winter sea-ice and atmospheric circulation anomaly patterns. Tom Agnew.

The freshwater transport of the Labrador current.
G. Mertz, S. Narayanan and J. Helbig.

Volume 26 No 3 December 1993 décembre

Climatological Bulletin

Bulletin Climatologique

Rainfall distribution during extended periods in mid-summer in southwestern Ontario.
T. Sribimawati, D.M. Brown and W.D. Hogg

Sea-ice anomalies in the western arctic and Greenland-Iceland Sea and their relation to an interdecadal climate cycle.
L. A. Mysak and S. B. Power

Climate variability and air quality in the great plains of North America. S. LaDochy.

NEWS AND COMMENTS/NOUVELLES ET COMMENTAIRES
The prairie drought of 1988. E.E. Wheaton, L.M. Arthur, B. Chorney, S. Shewchuk, J. Thorpe, J. Whiting & V. Wittrock.

Reply to comments on the applicability of GCM estimates to scenarios of global warming in the MacKenzie Valley area.
R.A. Stuart and A.S. Judge.

**CMOS
27TH ANNUAL CONGRESS
UNIVERSITY OF NEW BRUNSWICK
FREDERICTON, N.B.
June 7-11, 1993**

REGISTRATION FORM

RATES (Including taxes and banquet. Extra banquet tickets will be available at Registration.)

CMOS Members	\$170* ____
Non-members	\$190* ____
Students	\$70 ____
Retired/Life members	\$70 ____
Day Registration (at the Congress)	\$60 ____

* Members and Non-members can deduct \$20 from these rates if they register before May 1, 1993.

NAME _____

ADDRESS _____

TELEPHONE _____

FAX _____

Fill in and send with cheque payable to CMOS Congress '93:

Ardith Armstrong
Registration Convener, CMOS '93
Department of Forest Resources
University of New Brunswick
Bag Service # 44555
Fredericton, N.B.
E3B 6C2

**SCMO
27ième CONGRES ANNUEL
UNIVERSITE DU NOUVEAU BRUNSWICK
FREDERICTON, N.B.
7-11 JUIN, 1993**

FORMULAIRE D'INSCRIPTION

TAUX (Incluant taxes et banquet. Billets supplémentaires disponibles.)

Membre SCMO	\$170*	___
Non-membre	\$190*	___
Étudiant	\$70	___
membre pension/a vie	\$70	___
par jour (au Congrès)	\$60	___

* Rabais de \$20.00 a toute personne s'inscrivant avant le 1 mai, 1993.

NOM _____

ADRESSE _____

TELEPHONE _____

FAX _____

Remplir le formulaire et faire parvenir votre chèque payable à:
Congrès SCMO 93

Ardith Armstrong
Registration Convener, CMOS '93
Department of Forest Resources
University of New Brunswick
Bag Service # 44555
Fredericton, N.B.
E3B 6C2

THIRD INTERNATIONAL CONFERENCE ON SCHOOL AND POPULAR METEOROLOGICAL AND OCEANOGRAPHIC EDUCATION

July 14-18, 1993

ONTARIO SCIENCE CENTRE

Toronto, Ontario, CANADA

ACCOMMODATIONS A block of rooms has been reserved at the Radisson Hotel at special rates of \$69.00/single, \$69.00/double \$84.00/triple and \$109.00/quad plus tax. Children under the age of 17 stay in their parents' room at no charge. All prices are quoted in Canadian funds. These rates include; complimentary parking; complimentary limousine service to the Ontario Science Centre in the morning for those without transportation and the use of the fitness and leisure facility which offers domed indoor and outdoor pools, whirlpool, sauna and exercise room. Conference rates are available until June 29, 1993 or until the block is filled. For hotel reservations, call or write the Radisson Hotel, 1250 Eglinton Ave. E., Don Mills, Ontario, Canada M3C 1J3. Tel: 416-449-4111 or 800-333-3333(U.S. and Canada) attn: Reservations. **Be sure to mention the conference name when making your reservations. Make your reservations early! After June 29 or when the block is full, reservations will be handled on a space available basis.**

REGISTRATION

The registration desk will be open for conference registrants on Wednesday, July 14th at 8:00 a.m. and will be open for the duration of the conference. All persons must register.

FULL Registration includes admission to all conference sessions, public sessions, coffee breaks and BBQ, free parking at the Ontario Science Centre, plus a copy of both the preprints and the program. **FULL** Registration for teachers, CMOS members and OSC members is \$175.00 (\$135.00 U.S.) before May 1st and \$200.00 (\$155.00 U.S.) after May 1st. For others the registration fee is \$200.00 (\$155.00 U.S.) before May 1st and \$225.00 (\$175.00 U.S.) after.

STUDENT registration is available to full-time students and includes admission to all conference sessions, public sessions, coffee breaks and free parking at the Ontario Science Centre plus a copy of the program. **STUDENT** registration is \$90.00 (\$70.00 U.S.) before May 1st and \$100.00 (\$80.00 U.S.) after. A valid student I.D. must be presented at the registration desk or a photocopy submitted with the pre-registration form.

DAILY registration will be available at the conference. This does not include preprints or the BBQ but does include admission to all sessions, coffee breaks and free parking at the Ontario Science Centre on the day of registration plus a copy of the program. Daily registration is \$80.00 (\$65.00 U.S.). Student daily registration is \$35.00 (\$30.00 U.S.).

A registration form is included in this issue. Early registration fees are valid only if payment (cheque or money order in Canadian or U.S. funds) is received by May 1st, 1993.

LOCAL HOST

The Toronto Centre of the Canadian Meteorological and Oceanographic Society and the Ontario Science Centre are the local hosts.

BANQUET

There will be an informal BBQ held at the Ontario Science Centre on Thursday, July 15th in the evening. One BBQ ticket is included in the Full registration only. Additional tickets may be purchased at \$30.00 (\$25.00 U.S.) each.

TRANSPORTATION

North American Delegates:

Canadian Airlines International and their regional partners (Air Atlantic, Canadian Partner, Calm Air, Time Air, Inter-Canadian and Canadian North) have been appointed as the Official Airlines for the Third International Conference on School and Popular Meteorological and Oceanographic Education.

Save up to 50% off any full economy fare, pending availability, with a minimum GUARANTEED 15% off the full economy or Business Class fare in Canada.

Contact your local travel agent or call Canadian Airlines Conventionair Reservations toll-free at 1-800-665-5554 and advise them you will be attending the Third International Conference on School and Popular Meteorological and Oceanographic Education, on July 14-18th, 1993 in Toronto, Ontario, Canada. Our convention registration number is CV4630.

International Delegates:

If you are outside North America, call the local Canadian Airlines Reservation office.

Notes

If you are using a travel agency or corporate travel planner to make your arrangements, please ensure they register your booking with Canadian Conventionair.

Canadian Plus members will earn 1000 Bonus points in addition to their regular Canadian Plus mileage points. The Bonus point program includes free Canadian Plus membership. Be sure to ask for your Bonus points!

Airport to hotel

Toronto is served by Pearson International Airport. Taxi/Limo (approx. \$40.00 Cdn) and Bus service (requires 2 transfers) is available from outside the arrival (baggage) area to the Radisson (Toronto-Don Valley) Hotel.

Most major car rental companies have rental booths at the airport.

LOCAL ARRANGEMENTS

For more information, please contact Sheila Bourque, Chairperson, Local Arrangements Committee, c/o Canadian Meteorological and Oceanographic Society, P.O. Box 334, Newmarket, Ontario, Canada L3Y 4X7 (Tel: (416) 739-4220 Fax: (416) 739-4700.

Travel Subsidies

This conference is geared towards teachers and educators as well as the general public. CMOS is co-sponsoring this conference and would like to encourage the participation of as many teachers and educators as possible. The CMOS Council has decided to offer partial subsidies for the travel of a small number of teachers. Anyone interested in applying for a subsidy should contact Oscar Koren at the address below with a summary of your background, qualifications and interest plus financial assistance needed. All applications will be processed on a first come first served basis. If you would like more information, please contact Mr. Koren at the address below or at (416) 739-4712.

Oscar Koren,
Training Branch,
Atmospheric Environment Service,
4905 Dufferin St.,
Downsview, Ontario
M3H 5T4 Attn: AWTR/P

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

REGISTRATION FORM

Last Name: _____ First Name: _____

Position/Title _____ Affiliation: _____

Mailing Address: _____

City/Province/PostalCode: _____

Telephone: _____ Fax: _____ Telex: _____

Registration (before May 1):

(\$175 Cdn/\$135 US) Teacher ___ CMOS ___ OSC Member ___ || (\$90 Cdn/\$70 US) Student ___ ||
(\$200 Cdn/\$155 US) Other ___

Registration (after May 1):

(\$200 Cdn/\$155 US) Teacher ___ CMOS ___ OSC Member ___ || (\$100 Cdn/\$80 US) Student ___ ||
(\$225 Cdn/\$175 US) Other ___

Will you be accompanied by your: Spouse ___ and Family ___?

Additional BBQ tickets: ___ tickets @ \$30 Cdn/\$25 US = \$ ___

Total Amount Enclosed: Canadian funds \$ ___ US funds \$ ___

Please complete and return as soon as possible to: TIC/LAC, CMOS, PO Box/CP 334, Newmarket, Ontario, Canada L3X 4X7 Please make cheques payable to: CMOS - Education Conference

For further information, write to Ms. Sheila Bourque, Chair, Local Arrangements Committee at the above address.

Tel: (416)-739-4220 • Fax: (416)-739-4700

FOR OFFICE USE ONLY: No. Date Rec'd Postmark Amount Student ID Initials

**Activities of the Tides and Currents Section
of the Institute of Ocean Sciences,
Dept. of Fisheries and Oceans, Sidney, B.C.**

William Crawford and Fred Stephenson

Our group of 14 scientists and technicians form a group that has, since 1902, undertaken applied oceanography on the west coast of Canada. We describe here activities of the "tidal" half of the group.

Water Level Measurement - Pacific Coast

The group collects data from 16 permanent tide gauge stations in British Columbia. We process the data and archive it in our files, and also send it to the Marine Environmental Data Service (MEDS) in Ottawa. At present we record a continuous record of sea levels on paper charts, and digitize these records to produce hourly heights. Several of our stations are equipped with digital systems and modems for data acquisition by telephone, but these are presently used as backup systems only. These systems allow us to monitor sea levels in real time. They have proven useful during periods of high water level each year when there is some risk of flooding in low-lying areas.

Crustal Movement Studies

The Tides and Currents Section installed and operates five long term water level stations on Vancouver Island as part of a crustal movement study being carried out by the Pacific Geoscience Centre. The purpose is to measure crustal movements before and after a large earthquake, expected to hit the region in the next few hundred years. Mean sea level information collected at these five stations and our permanent stations on Vancouver Island and the mainland allow relative vertical crustal movements to be determined. Because such an earthquake is likely to be the most damaging and expensive natural disaster to hit Canada, we pay close attention to these stations and data from them, which we hope will help to determine the region of stress buildup prior to an earthquake. The Pacific Geoscience Centre provides some funding support for this program, which started in 1980. To date, most of the data collected is in close agreement with the geological models.

Tsunami Warning

We maintain 3 tsunami warning gauges as part of Canada's commitment to the Pacific Tsunami Warning System. These gauges are at Bamfield and Winter Harbour on the west coast of Vancouver Island and on Langara Island at the northwest tip of the Queen Charlotte Islands. The two gauges on Vancouver Island will transmit over the telephone lines a record of sea levels at one-minute intervals. Should a tsunami pass by these gauges these records will signal the time and height of the wave. If a tsunami is generated in Alaska, such information will be useful, for residents of southern Vancouver Island and the Washington and Oregon coasts. In turn, we rely on tsunami gauges in Alaska to warn west coast Canadian residents of our risk. All gauges can be reached directly by the Pacific Tsunami Warning Centre in Hawaii, who act as a central agency for tsunami warnings.

Once a tsunami is generated and while it is propagating toward the Canadian Coast, the Tides and Currents staff will provide estimated tsunami arrival times and tidal predictions to the Provincial Emergency Program personnel who issue the warnings. We expect to be called at any time of day to prepare this information.

Hydrographic Surveys

We provide the field hydrographers of the Canadian Hydrographic Service with portable tide gauges to measure water levels while they carry out their surveys. Once a survey is completed we process the tide gauge records and prepare tidal analyses. Our 80-year inventory of such records has provided the data needed to calibrate numerical simulations of the tides and tidal currents in B.C. waters.

Recently we designed and built a "Low-Power Tide Gauge" for use on such surveys in remote locations where commercial electrical power is unavailable. This unit transmits data via radio link, eliminating the need for hydrographers to visit the gauge at the end of each day of sounding. A private company now manufactures these units and has recently sent a shipment to the U.S. navy.

Water levels in the Western Arctic

The Tides and Currents Section maintains and operates 5 water level stations in the western Arctic. There is only one other permanent station presently being operated in Canada north of 57°N. These stations provide information on mean sea level trends and storm surges and are useful for establishing accurate chart datums for hydrographic surveys.

A number of temporary gauges have also been operated in the Arctic over the last 20 years. This program is continuing on an opportunity basis and has greatly improved our understanding of how the tide propagates through the many passages of the Canadian Arctic.

In-House Research

We carry out our own research programs. In 1983-5 we deployed eight temporary gauges to examine storm-forced sea level changes in Hecate Strait and, in a combined research program with scientists at the Pacific Biological Station in Nanaimo, combined this data with measurements of ocean currents, temperatures and catches of Pacific cod, to discover that sea levels at Prince Rupert and temperatures at Bonilla Island in winter could be used to predict the recruitment rate of cod three years into the future.

We have deployed tide gauges along the lower Fraser River and developed a numerical model of water levels and currents of the tidally-influenced part of this river.

Provision of data

We publish the Tide and Current Tables, Volumes 5 (Strait of Georgia and Juan de Fuca Strait) and 6 (Barkley Sound and Discovery Passage to Dixon Entrance). These give times and heights of high and low tides at reference ports and corrections for secondary ports. For tidal currents they present the times of slack water and time and speed of maximum flood and ebb currents. In 1991 we introduced calendar plots in these tables for four ports whose tides are not easily presented in tabular form. About 60,000 copies of west coast tide tables are sold annually.

Whenever a temporary tide gauge is installed, bench marks are set into nearby bedrock and surveyed to local sea level. We keep a record of all such benchmarks in British Columbia and compute their height relative to mean sea level, chart datum and geodetic datum. We now have all such records stored in Hypercard on our own network of Macintosh computers. This information is required by engineers who

design bridges, underwater pipelines or cables, or anyone building near the ocean who needs to know high water levels. With this system we can quickly send a map showing locations of benchmarks and their heights above chart datum or geodetic datum.

In addition, we provide special tide height or tidal current predictions for stations not in the Tide and Current Tables. We have computed the tide at the time of Captain Vancouver's voyage through the inside passage in 1792. We compute tidal heights for future years to help scheduling of ship launches, sand castle competitions and other events. In the past two years we have received more than a request a day for written predictions or observations, and the demand continues to grow.

Volume 31 No 1 March 1993 Mars

ATMOSPHERE-OCEAN

A unified theory of Available potential energy.
Theodore G. Shepherd

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.
Denis Gilbert.

A review of analytical models of sea-ice growth.
Matti Leppäranta.

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

INTERNATIONAL SYMPOSIUM ON SEA ICE

October 19 - 22, 1993

Beijing, China

This symposium is the first sea ice related international meeting held in mainland China. The scope of the program includes almost all aspects of sea ice. It may be of particular interest to people who wish to know more about sea ice research on the western Pacific. The meeting will be held at the National Research Centre for Marine Environmental Forecasts in Beijing, a government research institute devoted to the basic and applied research of the marine environment under the State Oceanic Administration.

Scope of program: Dynamics and thermodynamics of sea-ice
Sea-ice modelling and data assimilation
Operational ice forecasting
Sea-ice remote sensing
Oceanography and meteorology of marginal ice zones
Influence of sea-ice on climate
Air-ice, ice-ocean and ice-wave interactions
Sea-ice instrumentation
Ice engineering/ice-structure interactions
Environmental impact studies in ice covered waters

Major sponsors: Intergovernmental Oceanographic Commission - West Pacific Subcommittee, International Association for the Physical Sciences of the Ocean - Sea-ice Commission - Canadian Meteorological and Oceanographic Society - American Geophysical Union - Association of Sea-ice of China

Call for papers: All interested persons are invited to submit abstracts of their papers not to exceed 250 words to the Executive Secretary (address below). The authors are encouraged to submit the full papers for publication in a symposium proceedings. Deadline of submitting abstracts: May 1, 1993
Deadline of submitting full papers: September 1, 1993

Registration fees: Regular: U.S. \$200 before August 1, 1993
U.S. \$250 after August 1, 1993
Accompanying person: U.S. \$70 before August 1, 1993
U.S. \$100 after August 1, 1993

The regular registration fee covers transportation between hotel and the conference site, a copy of the symposium program and proceedings, coffee during session breaks, a symposium banquet, visits to research laboratories in Beijing. Registered accompanying person enjoy the same privileges as the regular participants except the symposium proceedings.

Accommodations: A block of rooms in a tourist hotel in Beijing have been reserved for symposium participants at a rate of U.S. \$85, which includes three meals a day. The participants can also book hotels of their choice in Beijing through their own travel agents.

Exhibition and excursions: An exhibition of scientific instruments, computer hardware and software and technical publications by local and foreign companies will be held concurrently with the symposium. Visits to research laboratories in Beijing will be arranged.

To receive the symposium circulars or make further enquiries about the symposium, please contact:

Mrs. Shi Ping Executive Secretary Office of Beijing '93 International Symposium on Sea-ice National Research Centre for Marine Environmental Forecasts No. 8 Da Hui Si, Haidian District Beijing, 100081 People's Republic of China

Telephone: (861) 8313593 Fax: (861) 8313593 or (861) 8313612 Telex: 22493 MFCEN CN

La Prochaine Generation

The Next Generation

The duties of the Executive Director include replying to students about how they would have to go about becoming meteorologists or oceanographers, and what the career prospects are. Some pamphlets on these subjects are available (from governments or universities) though they often tend to be somewhat dated. Should any members have relevant ideas or materials they would be appreciated by the Executive Director.

Although only a few acknowledgments to our replies are received, when they do arrive they often give much pleasure, like the following one received recently:

To Uri Schwarz,

I don't know if you remember me, but I am the one who wrote to you asking for information on oceanography.

I looked over the info you gave me and I seriously consider becoming an oceanographer or something else in that field! For my New Year's Resolution I swore I'd do the best I could in school to be an oceanographer.

Well, I wrote to you to say thank you for all the info you gave me. Just in case I forgot to! Thanks again!

Your friend

Une des tâches du Directeur Exécutif est de répondre aux étudiants qui veulent connaître les étapes à suivre pour devenir météorologues ou océanographes et quelles sont les perspectives d'emploi. Il est possible de se procurer de la documentation sur ces sujets auprès du gouvernement ou des universités, mais cette documentation devient rapidement périmée. Si quelque membre avait des idées ou du matériel appropriés, il serait très apprécié du directeur exécutif d'en être informé.

Malgré le fait que peu de remerciements fassent suite à nos envois d'information, les quelques-uns qui nous parviennent nous procurent grand plaisir, comme celui récemment reçu présenté ci-dessous :

A Uri Schwarz,

Je ne sais pas si vous vous souvenez de moi mais je suis celui qui vous a écrit pour vous demander de l'information sur l'océanographie.

J'ai regardé toute cette information que vous m'avez envoyée et je considère sérieusement l'idée de devenir océanographe ou quelque chose d'autre dans ce domaine. Pour ma résolution de la nouvelle année je me suis juré de faire de mon mieux à l'école pour devenir océanographe.

Je voulais juste vous écrire pour vous remercier pour cette information que vous m'avez envoyée. Juste au cas où j'aurais oublié ! Merci encore !

Votre ami

ACCREDITED CONSULTANTS/EXPERTS-CONSEIL ACCREDITES

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

Keith C. Heidorn, Ph.D.
CMOS Accredited Consultant
Applied Meteorology and Climatology, Micrometeorology
and Microclimatology, Atmospheric Dispersion

Axys Environmental Consulting, Ltd.
P. O. Box 2219
2045 Mills Road
Sidney, B.C., V8L 3S8 Canada
Tel: (604) 656-0881 Fax: (604) 656-4511

ACCREDITED CONSULTANTS/EXPERTS-CONSEILS ACCREDITES

Mory Hirt

*CMOS Accredited Consultant
Applied Aviation & Operational Meteorology*

*Meteorology and Environmental Planning
401 Bently Street, Unit 4
Markham, Ontario, L3R 9T2 Canada
Tel: (416) 477-4120 Telex: 06-966599 (MEP MKHM)*

Tom B. Low, Ph.D., P. Eng.

*CMOS Accredited Consultant
Research and Development Meteorology*

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

Ian J. Miller, M.Sc.

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

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

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
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1993 MEMBERSHIP APPLICATION FORM-DEMANDE D'ADHESION 1993

(Please print in block letters - Ecrire en lettres moulées s.v.p.)

Title: Dr ___ Mr ___ Mrs ___ Miss ___ Ma ___
 Titre: M. ___ Mme ___ Mlle ___

MEMBERSHIP CATEGORY-CATEGORIE DE MEMBRE
 ANNUAL FEES - COTISATION ANNUELLE
 (Please check one - cochez une case s.v.p.)

Name/Nom _____

Regular Régulier \$40.00/40,00\$

Address/Adresse _____

Student Étudiant \$20.00/20,00\$

Retired Retraité \$25.00/25,00\$

Sustaining De soutien \$150.00/150,00\$ (minimum)

Corporate Moral \$200.00/200,00\$ (minimum)

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

Occupation/Emploi _____

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.

PUBLICATION SUBSCRIPTIONS - ABONNEMENT AUX PERIODIQUES ANNUAL RATES - FRAIS D'ABONNEMENT ANNUEL

		<u>Members</u> Membres	<u>Non-members</u> Non-membres	<u>Institutions</u> Institutions
ATMOSPHERE-OCEAN	<input type="checkbox"/>	\$25.00	\$35.00	\$65.00
ATMOSPHERE-OCEAN		25,00\$	35,00\$	65,00\$
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Programme et résumés du congrès annuel		0,00\$	15,00\$	15,00\$

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

NOTE: Les membres étudiants reçoivent une publication gratuite de la SCMO et doivent indiquer celle désirée. Tous les périodiques réguliers de la Société sont envoyés aux membres moraux et de soutien. Les membres résidant au Canada doivent ajouter 7% (TPS) aux frais d'abonnement annuel.

PRIMARY FIELD OF INTEREST - SPHERE D'INTERET PRINCIPALE

Meteorology Oceanography
 Météorologie Océanographie

SPECIAL INTEREST GROUP - GROUPE D'INTERET SPECIAL

(Indicate group if interested - Indiquez si vous avez des intérêts dans un de ces groupes.)

Hydrology <input type="checkbox"/> Hydrologie	Air pollution <input type="checkbox"/> Pollution de l'air	Agriculture and Forest <input type="checkbox"/> Agriculture et foresterie
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Fisheries Oceanography <input type="checkbox"/> Océanographie des pêches	Other (specify) <input type="checkbox"/> Autre (spécifiez) _____	

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(Signature) (Date)

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

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

(Signature) (Date)

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Mail completed form to CMOS at the address above.

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