



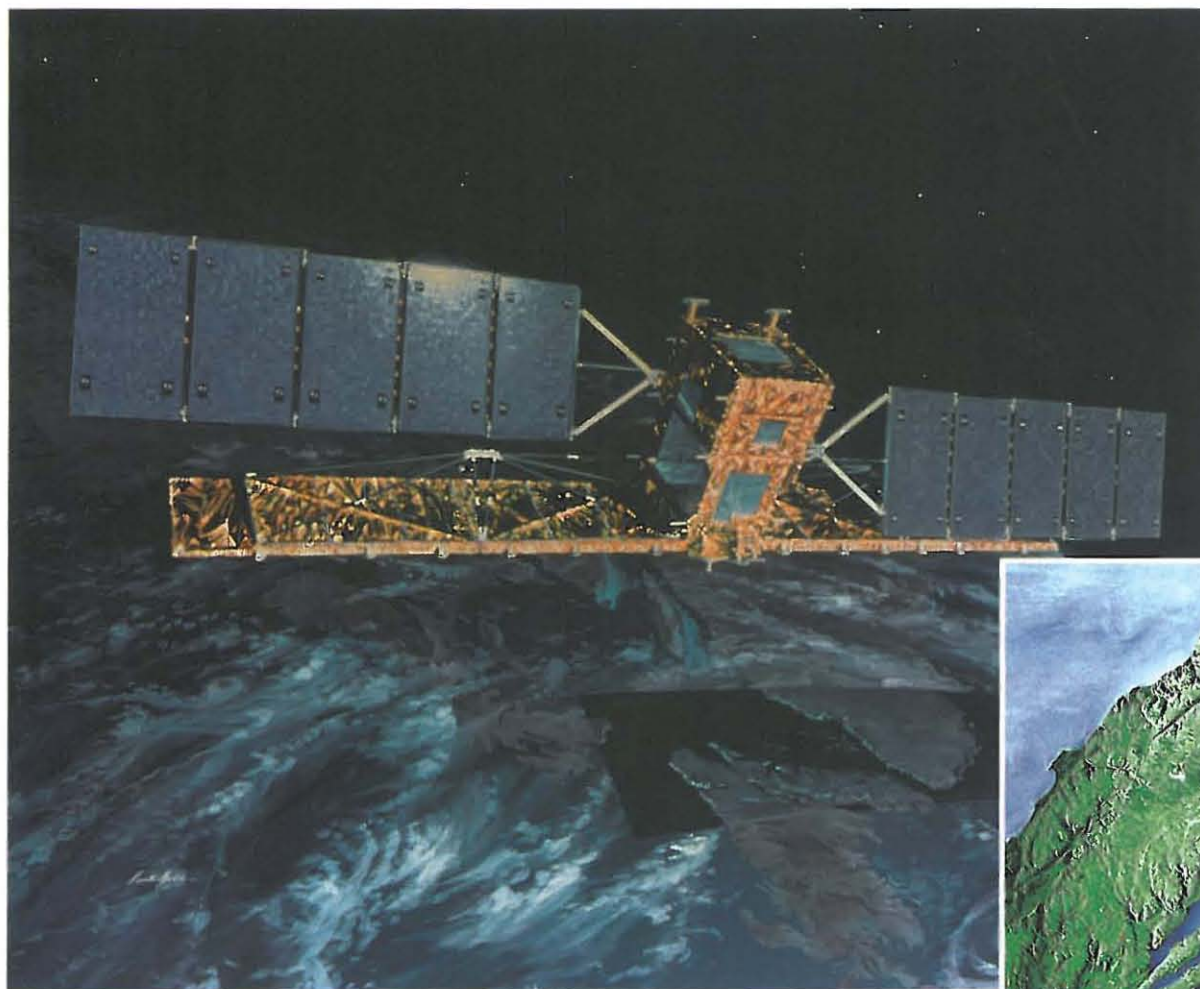
Canadian Meteorological  
and Oceanographic Society

La Société canadienne  
de météorologie et  
d'océanographie

# CMOS **BULLETIN** SCMO

*February / février 1996*

*Vol. 24 No. 1*



# RADARSAT-1

**First Image • Première image**

## CMOS Bulletin SCMO

"at the service of its members  
au service de ses membres"

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**Cover page:** The first RADARSAT image was acquired under conditions of darkness, overcast skies, rain and strong wind, at 5:41 p.m. local time on the evening of November 28, 1995. The satellite was in the ascending east-looking pass of its 348<sup>th</sup> orbit and its imaging mode was a Standard 1 beam, with an incidence angle of 23 degrees. The image shows a portion of Cape Breton Island, Nova Scotia, and is centered at latitude North 46°27'05" and longitude West 60°18'50". It covers an area of 132 km x 156 km with a spatial resolution of about 25 m. The image was obtained from an altitude of close to 800 km. Original photographs are courtesy of the Canadian Space Agency. Image received by the Canada Centre for Remote Sensing, processed and distributed by RADARSAT International. See page 17 for more details.

**Page couverture:** La première image de RADARSAT, obtenue sous des conditions d'obscurité, sous un ciel couvert de nuages et sous des conditions de pluie et de vent fort, fut prise le 28 novembre 1995 à 17:41, heure locale. Le satellite voyageait alors d'ouest en est et était dans une orbite ascendante, sa 348<sup>e</sup>. Il utilisait alors le mode faisceaux standard 1 et avait un angle d'incidence de 23 degrés. L'image illustre une portion du Cap Breton en Nouvelle-Écosse et est centrée à la latitude nord de 46°27'05" et de longitude ouest de 60°18'50". Elle couvre une superficie de 132 km par 156 km avec une résolution spatiale d'environ 25 m. L'image fut prise d'une altitude tout près de 800 km. Les photographies originales ont été gracieusement fournies par l'Agence canadienne spatiale. Image reçue par le Centre Canadien de télédétection, traitée et distribuée par RADARSAT International. Allez à la page 18 pour en lire plus.

### Next Issue - Prochain numéro

The next issue of the *Bulletin 24 (2)*, April 1996, will go to press by mid April. We need your contributions, short articles, notes, presentations, chronicles, etc, by early April. Don't miss your chance!

Le prochain numéro du *Bulletin 24 (2)*, Avril 1996 sera mis sous presse vers la mi-avril. Vos contributions sont les bienvenues. Veuillez bien me les faire parvenir d'ici le début d'avril. Ne manquez surtout pas votre coup!

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## Effets des UVB sur les ressources marines<sup>1</sup>

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### Abstract

This paper is debating whether the UVB radiance, usually associated with the depletion of the ozone layer, can have negative effects on marine resources in the Gulf of St. Lawrence. It further describes the research program now being effected at IML to adequately answer this vital question.

### 1. Historique

Au cours des cinq dernières années, on a noté une augmentation significative de l'intensité du rayonnement ultraviolet B (UVB: 280-320 nm) atteignant la surface de la Terre. Cet accroissement, qui est directement lié à une diminution de l'épaisseur de la couche d'ozone, a été signalé non seulement au-dessus de l'Antarctique, mais également dans des régions de latitude moyenne de l'hémisphère Nord qui correspondent aux principales zones marines de pêche.

De plus en plus d'études indiquent que les UVB sont nocifs pour les organismes aquatiques et pourraient réduire la productivité des écosystèmes aquatiques. On a déjà signalé de tels effets des UVB sur la productivité du phytoplancton et du zooplancton, qui sont des niveaux clés de la chaîne alimentaire marine. Une étude analogue portant sur des oeufs et des larves de poissons, et datant de quelque 15 années, suggère que l'exposition à des intensités relativement faibles d'UVB peut entraîner une plus forte mortalité pouvant causer une baisse du recrutement chez les populations adultes d'espèces à valeur commerciale. On a également signalé d'importants effets sublétaux. Des études plus récentes indiquent que l'exposition à de faibles intensités d'UVB affecte négativement l'embryogenèse chez les poissons et pourrait également diminuer la quantité du sperme. Par ailleurs, ce qui pourrait être plus grave pour les stocks de poissons dont les oeufs et les larves se tiennent normalement près de la surface, il a été suggéré récemment que le déclin dramatique mondial de certaines populations d'amphibiens (en nombre et en diversité) pourrait s'expliquer par une vulnérabilité à l'accroissement

des UVB de leurs premiers stades du cycle de vie (oeufs et larves).

Plusieurs espèces de crustacés aquatiques et de poissons sont dotées de cellules photoréceptrices sensibles au rayonnement ultraviolet A (UVA: 320-400 nm) qui influent sur leur comportement d'alimentation et d'orientation. Ces organismes possèdent en plus de leurs bandes d'absorption primaires (les bandes  $\alpha$ ) des pigments visuels verts et bleus qui comportent une bande d'absorption secondaire (la bande  $\beta$ ) sensible aux UVB. Cette bande d'absorption  $\beta$  compte pour environ 30 % de la sensibilité d'un pigment visuel. Étant donné que les photorécepteurs et leurs bandes  $\alpha$  et  $\beta$  sensibles aux UV jouent un rôle dans les comportements qui sont influencés par la vision (migration verticale, orientation, broutage, par exemple), les changements d'intensité des UVB incidents ou du rapport UVA sur UVB peuvent modifier sensiblement les réponses comportementales des organismes marins qui possèdent une telle sensibilité. Par exemple, un changement d'intensité des UVB pourrait entraîner des modifications des distributions verticales de copépodes et de larves de poissons, et/ou du succès d'alimentation.

Même si ce phénomène est encore relativement peu connu, des intensités biologiquement actives d'UVB peuvent pénétrer dans les colonnes d'eau jusqu'à des profondeurs de 15 m. Dans l'estuaire et le golfe du Saint-Laurent, les interactions biophysiques les plus importantes (déterminant la productivité) surviennent dans les 25 premiers mètres de la colonne d'eau. C'est dans cette couche qu'on trouve les oeufs et les larves de crustacés (ex. *Calanus*) et de poissons marins (ex.

<sup>1</sup>Publié originalement dans la revue "Nouvelles des Sciences", Institut Maurice-Lamontagne, Vol 6, No.21, 21 octobre 1995. Reproduit avec la permission de l'auteur et de l'éditeur.

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morue) à valeur commerciale. A ces latitudes, les habitats marins, et en particulier les premiers stades du cycle de vie de certains crustacés et poissons, peuvent donc être particulièrement vulnérables aux fluctuations des UVB incidents.

Alors qu'on dispose de certaines informations concernant les effets des UVB sur certains organismes marins, on ignore cependant l'impact possible d'un accroissement des UVB sur la *production et la diversité* de l'écosystème marin. Cette lacune ne se limite pas aux eaux du golfe du Saint-Laurent, mais s'applique également aux écosystèmes aquatiques ailleurs que dans l'Antarctique. Même dans cette dernière région, on ne dispose pas d'évaluations des répercussions possibles, à l'échelle de l'écosystème, de l'intensité croissante des UVB. On reconnaît maintenant, dans le monde entier, la nécessité d'obtenir plus d'information, le plus rapidement possible.

Étant donné qu'on s'attend à ce que l'appauvrissement de la couche d'ozone se poursuive pendant encore quelque 20 à 50 ans, il est important que le ministère des Pêches et des Océans en arrive à une meilleure compréhension du rôle possible des UVB dans les écosystèmes marins. Une telle information contribuera à améliorer l'évaluation et la surveillance des écosystèmes et à mieux caractériser l'état de l'habitat marin et des ressources marines du réseau du Saint-Laurent.

## 2. Programme de recherches sur les UVB de l'IML

Afin de répondre aux besoins d'information mentionnés plus haut, l'IML a récemment entrepris un programme de recherche visant à surveiller l'intensité des UVB et à évaluer leur impact sur l'écosystème marin de la région du Saint-Laurent. Ce programme est financé par le programme Saint-Laurent Vision-2000.

On a entrepris les activités suivantes:

- 1) Mesure de l'intensité des UVB sur terre et en mer dans la région de l'estuaire et du golfe du Saint-Laurent.
- 2) Évaluation des effets létaux et sublétaux (morphologiques, physiologiques et comportementaux) des UVB sur les premiers stades du cycle de vie du zooplancton (principale espèce étudiée, *Canalys*) et de poissons (principale espèce étudiée, morue de l'Atlantique, *Gadus morhua*).

L'objectif principal est de déterminer si l'intensité croissante des UVB, associée à l'appauvrissement de la couche d'ozone, aura des incidences néfastes sur le recrutement des stocks de zooplancton et de poissons à

valeur commerciale.

## 3. Collaboration avec Environnement Canada

Les météorologues du Service de l'environnement atmosphérique d'Environnement Canada (SEA) à Downsview (Ontario) participent avec nous au projet:

- 1) en mettant à notre disposition des mesures d'UVB atmosphériques et de l'épaisseur de la couche d'ozone obtenues à l'aide de leurs stations de surveillance à Montréal, Goose Bay et Halifax;
- 2) en mettant en place, à partir d'avril 1995 et pour deux ans, des capteurs terrestres d'ozone et d'UVB placés sur le toit de l'IML;
- 3) en participant au développement d'un modèle de transfert radiatif destiné à prévoir l'intensité des rayonnements UV sous-marins à partir de mesures atmosphériques; et,
- 4) en partageant avec nous le salaire d'un agrégé de recherche de niveau post-doctoral qui travaillera sur les systèmes optiques UVB.

## Bibliographie abrégée des articles sur le rayonnement UVB

Blaustein, A.R., P.D. Hoffman, D.G. Hokit, J.M. Kiesecker, S.C. Walls and J.B. Hays, 1994, *UV repair and resistance to solar UV-B in amphibian eggs: A link to population declines?*, Proc. Natl. Acad. Sci. USA 91:1791-1795.

Bothwell, M.L., D. Sherbot and C. Pollock, 1994, *Ecosystem response to solar ultraviolet B radiation: influence of trophic-level interactions*. Science 265: 97-100.

Kerr, J.B. and C.T. McElroy, 1993, Evidence for large upward trends of ultraviolet-B radiation linked to ozone depletion, Science 262: 1032-1034.

Smith, R.C. et al. 1992, *Ozone depletion ultraviolet radiation and phytoplankton biology in Antarctic waters*, Science 255: 952-959.

## Editor's Acknowledgement

The article entitled "Acknowledging The Weather-Health Link" by John L. Bart, B.Sc., MBBS, and Denis A. Bourque, M.Sc., was reprinted in Vol.23, No.6, pp.9-12, of the CMOS Bulletin SCMO by permission of the Canadian Medical Association. The original paper appeared in the Canadian Medical Association Journal, October 1, 1995, Vol.153 (7), pp.941-944.

# The Canadian National Science Plan for the Arctic Climate System Study<sup>1</sup>

Eddy C. Carmack<sup>2</sup>, Humfrey Melling, Ronald E. Stewart, Philip Marsh,  
and Gregory M. Flato

## Background

In April, 1994, the Joint Scientific Committee (JSC) approved the Arctic Climate Systems Study (ACSYS) as a recognized programme of the World Climate Research Programme (WCRP). At the request of the Canadian Climate Research Committee (CCRC) a committee was formed to prepare a Canadian ACSYS Science Plan. This committee, formed around the main research topics identified in the ACSYS Initial Science Implementation Plan, solicited input from Canadian researchers. A document has been prepared which presents research goals and priorities for Canada in support of the international ACSYS.

## 1. Scientific Goal and Objectives of ACSYS

The goal of the Arctic Climate Systems Study is to ascertain the role of the Arctic in global climate (1). ACSYS seeks to develop Arctic science activities under three objectives: 1) to understand the interactions between the Arctic Ocean circulation, its ice cover, the atmosphere, and the hydrological cycle; 2) to initiate climate research and monitoring programmes for the Arctic; 3) to provide a scientific basis for the representation of the Arctic in global climate models. ACSYS commenced in January 1994 and will continue for a ten years.

Scientific activities within ACSYS address five research areas: ocean circulation, sea-ice, the atmosphere, hydrology, and modelling. The Canadian ACSYS Science Plan identifies Canadian studies and opportunities within these five areas, and links with related national and international programmes. Canadian objectives can only be achieved through close connection with the international effort.

It is proposed that Canadians within ACSYS assume responsibility for improving understanding and modelling with respect to two relevant themes:

- the interactions between the atmosphere, sea ice, ocean and terrestrial water bodies within the Canadian Arctic Archipelago;

- the interaction between shelf and basin waters within the Beaufort Sea.

Each is a natural focus for Canadian interests. Each builds upon existing Canadian expertise and is addressable with limited resources. A Canadian programme built around these themes will make a useful contribution to Arctic and global climate studies.

## 2. Ocean Circulation Programme

To represent the Arctic region accurately in global climate models requires an understanding of ocean circulation. The Arctic Ocean Circulation Programme is designed around four components:

- The Arctic Ocean Hydrographic Survey - to collect hydrographic data to determine the general circulation and hydrography of the Arctic Ocean.
- The Arctic Ocean Shelf Studies - to understand how shelf processes partition salt and fresh water, and how the associated buoyancy is coupled to the ocean interior.
- The Arctic Ocean Variability Project - to assess the variability of the ice cover, circulation, and thermohaline structure of the Arctic Ocean.
- The Historical Arctic Ocean Climate Database Project - to establish a hydrographic database for the Arctic Ocean for application to research and modelling.

Canadian activities that have contributed to ACSYS include: 1) participation in multi-national surveys, such as the Canada/U.S. 1994 Arctic Ocean Section; 2) ongoing ocean research on the shelves of the Beaufort Sea and Arctic Archipelago; 3) observation of long-term variability of ocean conditions and sea-ice thickness in the Beaufort Sea; 4) work on the transfer of oceanographic data from Russia to international databases.

Important future Canadian contributions should include: 1) continued participation in deep-ocean surveys, especially in the Canada Basin and north of the Queen Elizabeth Islands; 2) expanded surveys of Arctic shelf seas, particularly within the Arctic Archipelago, to understand

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<sup>1</sup> Comment and criticism to Ed Carmack (carmack@ios.bc.ca) are solicited by the authors at this time.

<sup>2</sup> E. Carmack: Ocean Circulation; H. Melling: Sea Ice; R. Stewart: Atmospheric Science; P. Marsh: Hydrology; G. Flato: Modelling.



the through-flow and associated atmospheric and hydrologic processes; 3) continued maintenance of long-term oceanographic moorings and 4) initiation of repeat hydrography operations in the Beaufort Sea and Eastern Arctic.

### 3. Arctic Sea Ice Programme

Sea ice plays pivotal roles in the Arctic heat budget and ocean circulation. In order to improve the representation of sea ice in global climate models three activities are recognized by ACSYS:

- Arctic Basin-Wide Sea-Ice Climatology - to obtain a sea-ice database encompassing surface and satellite observations over the Arctic Ocean.
- Export of Sea Ice - to measure the export of sea ice through Fram Strait and the Canadian Arctic into the convective gyres of the North Atlantic.
- Arctic Sea-Ice Process Studies - to improve the description of mechanical and thermal processes determining sea-ice thickness.

Canadian sea-ice research that has contributed to ACSYS includes: 1) collection of a 40-year record of snow and ice thickness at Canadian Arctic weather stations; 2) use of subsea sonar to observe the draft of sea ice and its interannual variability in the first-year and multi-year ice regimes of the Arctic Ocean; 3) development of sea-ice remote sensing capabilities, culminating in the launch of Radarsat in 1995; 4) participation in integrated studies of ice-atmosphere-ocean interaction and the dynamics of polynyas in the eastern, high and western Canadian Arctic.

Future Canadian contributions will comprise a continuation of these activities, and an expansion of transport monitoring to observe exports through the Arctic Archipelago. ACSYS will benefit greatly from the operational ice reconnaissance of the Ice Service of AES.

### 4. Arctic Atmosphere Programme

The Arctic atmosphere forces the Arctic Ocean circulation and sea-ice cover. Through the cloud and radiation fields, it also provides an essential heat sink for the climate system, so maintaining the meridional temperature gradient and the atmospheric general circulation. An improved atmospheric database is needed to increase understanding of Arctic processes, to verify atmospheric circulation models, and to provide observations to estimate the forcing of ice and ocean. The following work is proposed:

- Promote a re-analysis of Arctic historical data based on modern NWP assimilation.
- Encourage field campaigns to increase understanding of the atmospheric physical processes pertinent to Arctic climate.

- Develop a polar clouds and radiation programme with particular emphasis on improved techniques for satellite retrievals of cloud and radiation properties.

An action plan for the Canadian ACSYS will comprise the following: 1) summarize existing climate studies of the Canadian Arctic; 2) correct historical data from the Canadian Arctic to present standards; 3) analyze historical data to produce climatologies for precipitation, wind, temperature, blowing snow, cloud, moisture, etc; 4) use ECWMF/NMC re-analysis to study moisture fluxes, wind, and surface heat and momentum fluxes; 5) carry out field studies on large-scale atmospheric flows, air mass evolution, water cycling, radiation and cloud systems; 6) explore datasets on low-level stability (SIMMS), surface radiation (BASE and SIMMS), and clouds in relation to surface features; 7) use satellite data to analyze radiation budgets, clouds and aerosols; 8) evaluate GCM performance in the Canadian Arctic.

Important future Canadian contributions include participation in planned field programmes, including the Canadian GEWEX Enhanced Study (CAGES), the U.S. Surface Heat Budget of the Arctic Ocean (SHEBA) programme, the Arctic FIRE and U.S. FASTEX experiments, and the Labrador Sea Experiment.

Special efforts should also be made to expand research efforts aimed at describing the role of the Canadian Arctic Archipelago in atmospheric circulation.

### 5. Arctic Hydrology Programme

The two major components of the hydrological programme are the compilation of an Arctic hydrological database and the development of hydrological models of selected Arctic regions. Co-ordination of existing data collection and modelling efforts will be an essential function. The following activities are suggested:

- co-ordinate the development of an Arctic Precipitation Data Archive (APDA) containing daily total precipitation (both liquid and solid) data from all observing stations.
- organize an Arctic run-off database (ARDB) through an international exchange of hydrological data at each of the gauge-sites where hydrometric observations are made.
- facilitate macroscale modelling to include atmospheric and surface (catchment) components.

Important future Canadian contributions should include the adaptation to the Arctic of macroscale hydrological

models developed in the framework of GEWEX, and the development of mesoscale hydrological models for selected Arctic river catchments. Formulation of the ice phase will be a major element of such efforts. There is also a strong need to address hydrological processes in high Arctic drainage systems in the Arctic Archipelago. Such work would build on the Canadian GEWEX programme.

Because of overlapping objectives with other global change programmes, the hydrology effort will interface with on-going and planned national and international programmes, especially GEWEX and LOIEX.

## 6. ACSYS Modelling Programme

An ultimate goal in climate modelling is to optimize and apply fully-coupled models of the atmosphere/sea-ice/ocean system. In order to understand this complex interaction, ACSYS proposes a number of numerical experiments involving a hierarchy of models, and work on refining sub-grid parameterizations to represent small-scale physics better in large-scale models.

A range of relevant Arctic modelling activities is currently underway in Canada. This forms the basis of a strong Canadian contribution to ACSYS. Specific studies include: 1) modelling of basin- and regional-scale sea-ice processes with the goal of improving the representation of sea ice in climate models; 2) collaboration in international ice-model intercomparisons; 3) application of ice-ocean models to the Arctic to investigate circulation; 4) use of thermohaline circulation modelling to illuminate the role of Arctic freshwater in modulating the North Atlantic overturning; 5) development of a global climate model which includes a three-dimensional global ocean and its ice cover; 6) investigation of the treatment of clouds and radiatively active gases and aerosols in atmospheric models; 7) development of a regional climate model at fine resolution.

This research is being conducted at Canadian government laboratories and universities. Involvement in the modelling components of projects like CRYSYS, BOREAS, BASE, GEWEX and WOCE enhances the high-latitude research effort and collaboration. Future activities will build on the studies currently underway. Improved capabilities to model the Arctic will benefit other activities such as weather prediction and ice forecasting.

## Conclusions

Canadian researchers have thus far played a strong part in shaping the international ACSYS Implementation Plan, and many Canadian science activities have served as models for future international projects. Important

contributions have already been made by Canadians in advancing the fundamental knowledge base required to meet the ACSYS objectives.

Much of the success of Arctic research in Canada is due to the excellent operational and logistics support provided by federal agencies working in the North (e.g. Polar Continental Shelf Project, Canadian Coast Guard, Ice Services Environment Canada, Water Resources Branch). It is essential that support to these agencies be maintained. The Canadian ACSYS will benefit greatly from integration with other programmes aimed at understanding the Arctic in the context of global change (e.g. GEWEX, CLIVAR, CRYSYS, BOREAS, LOIEX).

Two themes have been identified which provide a focus for Canadian activities: 1) Atmosphere-ice-ocean exchanges in the Canadian Arctic Archipelago; 2) Shelf exchange processes in the Beaufort Sea. These themes arise from the unique geography of Canada's high Arctic, provide an opportunity for interdisciplinary research, and build on previous studies and existing logistical infrastructure. Promoting research around these themes will maximize the benefit derived by Canada from ACSYS, and will strengthen the Canadian contribution to ACSYS. The coordination of studies around themes will be highly beneficial to subsequent model validation.

Continued participation and leadership in ACSYS will clearly benefit Canadian science and policy by:

- Stimulating new surveys in the Canada's Arctic.
- Integrating oceanography, hydrology, and atmospheric and cryospheric research.
- Levering international support for climate research benefiting Canadian interests.
- Developing a new generation of Canadian researchers in Arctic science.
- Providing opportunities for Northern residents in long-term research.
- Demonstrating Canadian technologies and capabilities in Arctic remote sensing, navigation and communications.
- Demonstrating to policy makers the effectiveness of coupled climate models in the Canadian Arctic.
- Maintaining Canadian sovereignty, building awareness of Arctic Canada and expanding Canadian influence in international Arctic environmental stewardship.

Canada is an Arctic country and must be a full partner in the international ACSYS.

(1) WCRP, 1994. *Arctic Climate System Study (ACSYS): Initial Implementation Plan*, WCRP-85, WMO/TD-No.627, 57 pp.

## **"The Weather Forecaster" at Discovery Centre**

Blair Greenan<sup>1</sup>, Fred Dobson<sup>1</sup>, Jim Abraham<sup>2</sup> and Rick Sanderson<sup>3</sup>

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<sup>2</sup>Maritimes Weather Centre, Environment Canada

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### **Abstract**

*"The Weather Forecaster"*, an interactive, multimedia, weather-forecasting exhibit, was developed as part of a remote sensing exhibition entitled *"Satellites, Watchdogs & Cool Heat"*, which opened at Discovery Centre in Halifax, Nova Scotia in December 1994. The goal of this exhibit is to enable patrons of Discovery Centre to make their own short-term weather forecast by providing them with a sufficient amount of real-time data. Upon completing the exhibit, users can print out their forecasts and take them home for comparison to what actually happens. It is hoped that this exhibit will give the general public a better appreciation of what is involved in making a weather forecast.

The development of this exhibit was a collaborative effort between the Department of Fisheries and Oceans (Bedford Institute of Oceanography), Environment Canada (Atlantic Region), Hewlett-Packard Canada Limited, and Discovery Centre. The exhibit has proven to be reliable, robust and popular, and a travelling version has been developed for a touring exhibition.

### **1. Introduction**

Since its opening in October 1990 in Halifax, Nova Scotia, Discovery Centre has established itself as a vital resource to schools, the general public and community organizations. Through hands-on exhibits, workshops, lectures and educational programs, the Centre has become a major force in raising awareness of science and technology among the public. By helping to interpret the science and technology being developed in the Maritimes, Discovery Centre is helping citizens understand the role of these developments in the daily life and in the economy. For these reasons, we believed that providing the public with an exhibit which enabled patrons to do their own weather forecast would benefit both the general public and the government agencies which provide this service by fostering a better appreciation of what is involved in making a weather forecast.

In 1993, planning and development started in earnest for a remote sensing exhibition at Discovery Centre. At this time, one of us (Dobson) was serving on the Board of

Directors and the Exhibits Committee for Discovery Centre. He approached Doug Fraser of Hewlett-Packard Canada with his idea about a weather forecasting exhibit for the remote sensing exhibition. Mr. Fraser enthusiastically endorsed the idea and indicated the Hewlett-Packard would be interested in sponsoring such an exhibit through a donation of the necessary hardware.

In February 1994, a meeting was held at Environment Canada in Bedford, N.S. to discuss the feasibility of producing a weather forecasting exhibit. It was the general consensus of those attending the meeting that the project was well worth the effort. It was decided that the exhibit must be a real-time forecasting exercise in order to maintain user interest over an extended period of time, and that several levels of difficulty should be built-in to the exhibit in order to cater to the wide range of skill levels of those who visit Discovery Centre (approximately two-thirds of the Centre's patrons are children). In addition, it was felt that it was important to provide as much local weather content as possible and to provide the users of the exhibits with weather products that are not normally

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E-mail: discover@ac.dal.ca.



directly available to the general public. The goal of the exhibit would be to provide people with enough real-time data to make their own short-term weather forecast, and in the process to give them an appreciation of what goes into making a forecast.

## 2. Exhibit Development

In the spring of 1994, Hewlett-Packard contributed a UNIX workstation (model 712/60, 19" monitor, 32 MB RAM, 0.5 Gbyte hard disk, HP 4MP Postscript printer), thus providing us with most of the hardware necessary for the exhibit. Excellent technical support for the workstation, provided by Chuck Munro from Hewlett-Packard's Dartmouth office, made development of the exhibit much easier. The other major hardware-related issue was communications between the HP workstation at Discovery Centre and the computers at Environment Canada. The decision to produce a real-time forecasting exhibit meant that an almost continuous communications link was necessary. This proved to be an expensive and difficult problem to solve and find sponsorship for. Eventually Maritime Tel & Tel generously provided Discovery Centre with a dedicated Internet connection for "*The Weather Forecaster*" as well as for two public-access terminals for the local community network, the Chebucto Community Net.

By the summer of 1994, the development of the exhibit was making slow but steady progress. The exhibit was due to open as part of the "*Satellites, Watchdogs & Cool Heat*" remote sensing exhibition in December. Our dilemma was that we had an excellent hardware platform on which to produce this exhibit, but very little money to purchase multimedia software. Fortunately for us, around this time NCSA released version 2 of their free World Wide Web browser Mosaic. We decided that we could use this as our graphical user interface for this multimedia exhibit. With the growing interest in the Web at this time, other helper applications for Mosaic were developed which provided us with viewers for still images and movies in various formats. In addition, the HP workstation has built-in audio capabilities that enabled us, with the addition of two speakers, to provide narration for the exhibit.

After deciding what software to use along with the outline for the exhibit, a number of other design issues had to be dealt with:

- ⇒ how to design a mouse-only exhibit to reduce security problems with the workstation;
- ⇒ modifying the Mosaic source code so that the user would be limited to actions deemed necessary for the exhibit (e.g. no access to other Internet locations, no saving files to the hard

- disk, ability to print their forecast);
- ⇒ limiting print-outs to one per user;
- ⇒ making MPEG animations of satellite and radar imagery and weather maps;
- ⇒ implementing an interactive program to present local temperature, pressure and winds;
- ⇒ automating the real-time updating process so that data and imagery are downloaded each hour via the Internet connection between Discovery Centre and Environment Canada's server, and subsequently generating the new movies.

At the same time this exhibit was being developed, an electronic weather textbook was being produced at the Daily Planet Web site (<http://www.atmos.uiuc.edu>) at the University of Illinois at Urbana-Champaign as a supplement to an NSF funded project entitled CoVis (<http://www.covis.nwu.edu>). The CoVis Project is attempting to transform science learning to better resemble the authentic practice of science. The authors of the electronic textbook graciously agreed to allow us to use the textbook as an on-line weather reference. This textbook contains material on Optics, Pressure, Forces and Wind, Satellite and Radar Imagery, and Clouds as well as a glossary. Minor modifications were made to the textbook to accommodate the differences in the Canadian and American systems. The acquisition of this on-line reference contributed greatly to the exhibit and would have been impossible to produce with the resources available to the project.

The exhibit opened on December 9th, 1994. It has been operating very successfully since that time with only a few minor modifications necessary.

## 3. How Does It Work?

The exhibit has been structured to offer the user three levels of difficulty. The HP-VUE (Visual User Environment) has been modified so that there are only two icons presented to the user on the monitor: one icon starts the exhibit and the other enables the user to close any of the windows that the previous user may have left on the screen. All other options have been removed to reduce security problems with the computer. When the user presses the "Start" button, the Mosaic Web browser appears on the screen with Level 0 of the exhibit. The page which appears in the Mosaic window contains two

buttons. The first button is a graphic of a loudspeaker with sound emanating from it. If the user pushes this button, a sound file is played which introduces the exhibit and narrates the remainder of Level 0. By clicking on the second button one satellite and one radar movie are displayed on the monitor. This level gives the users information about present weather conditions and urges them to continue and to make their own weather forecast.

If the users choose to make their own weather forecast they are presented with the option of doing either a six-hour (Level 1) or one-day (Level 2) forecast. The user can navigate within the exhibit using only a mouse by clicking on highlighted text or graphics which are links to other documents (text, sound, graphics, or movies) on the computer.

In order to make "*The Weather Forecaster*" functional as a real-time forecasting exhibit, the process of updating the movies, imagery and data had to be fully automated. Every hour the HP workstation at Discovery Centre makes an ftp (file transfer protocol) connection to the Internet server at Environment Canada's server in Bedford, N.S., and transfers the most recent satellite and radar imagery as well as observations of temperature, pressure and winds (T, P, WND) from Halifax, Yarmouth, Sydney, and Sable Island. When the ftp transfer is finished the computer generates new mpeg movies for the last 48 hours of GOES-8 visible and infrared satellite imagery and for the composite radar data from across Canada, and for approximately the last six hours from the radar at the Halifax International Airport. This process is repeated each hour of the day, seven days a week.

Users are guided through the data starting from the large-scale imagery of the infrared and visible satellite movies, to the radar movies and finally to the local temperature, pressure and winds. At each step they can click on an audio button to have narration of the page they are viewing. People using such exhibits tend not to read the text and hence the addition of audio is an important component of the exhibit. Each Mosaic page is dedicated to one data type (e.g. visible satellite images) which is described briefly in text and audio (with links to more detailed descriptions and definitions in the on-line textbook and glossary) along with the link to that data type (e.g. satellite movie). In addition, at the bottom of every page in the Mosaic window there is a button which returns the users to the start of the exhibit and a button which takes them to the start of the on-line textbook. Figure 1 displays a clickable imagemap which allows the users to navigate around in the textbook; clicking on the appropriate filing cabinet or folder brings them to that part of the textbook.

Examples of the types of graphics products provided to the exhibit by Environment Canada each hour are GOES-8 Infrared satellite image, radar image from Halifax

International Airport and composite for Canada from all of Environment Canada's radars. The local variables (T,P, and WND) are presented (Figure 2) in a separate application, launched by clicking on a button in Mosaic, which is designed using HP's *Starbase Graphics* program. This program displays a line graph for temperature and pressure for the last 36 hours along with a series of round balls that users can manipulate to draw their best guess of the future trend for the appropriate forecast period. This adds an important level of interactivity to these variables. The winds are presented as a staff with barbs for each hour over the previous 36 hours. It was decided that this would not have the level of interactivity of temperature and pressure because of the complexity of drawing the barbed staffs. The local variables provide an important addition to the exhibit by showing trends in temperature (diurnal and storm-related), pressure (approach of a storm) and winds (changes of direction with passage of a weather system).

It is hoped that users can integrate the information from these different data sources so that they develop an understanding of how clouds, precipitation and local conditions are related. Level 1 of the exhibit (six-hour forecast) works on the basis of extrapolating from the trends seen in the movies and the line charts. Level 2 (one-day forecast) adds products from the Canadian Meteorological Centre's Regional Finite Element forecast model as additional aids to users because of the extended time period. These CMC products include a time-lapse movie of forecast surface pressure for the Eastern seaboard as well as some forecast variables including precipitation, relative humidity, cloud cover, and temperature.

After the users have viewed all the data available, they are presented with a page in the Mosaic window which allows them to make a forecast of sky conditions, temperature, pressure and precipitation type by clicking on the appropriate buttons. When they press the "Submit Your Forecast" button at the bottom of this page, a new page is generated on-the-fly by the computer and displayed in the Mosaic window. Users can then print this page and take it home with them to compare their forecast with what actually happens

After users have printed out their forecast they are asked to provide some feedback about the exhibit by answering a series of five questions. The results of the feedback from Level 1 of the exhibit indicate that 71% liked the exhibit, while 81% said they learned something about weather. When asked what they liked most about the exhibit, users chose "Making my own forecast", "Satellite movies" and "Current weather" to be their favourites.



## 4. Conclusions and Future Plans

An interactive, multimedia, weather-forecasting exhibit has been developed that has been designed to give the general public a better understanding and appreciation of the process of making a weather forecast. The exhibit is the first of its kind to bring this level of interactivity to a weather exhibit, and has proven very popular at the Discovery Centre. The exhibit requires a fairly long attention span because of the amount of information processing required before a forecast can be made. It takes a first-time user approximately 15-20 minutes to complete Level 1 (six-hour forecast) of the exhibit.

The Canadian Space Agency is sponsoring the development a travelling version of five of the remote sensing exhibits at Discovery Centre including "*The Weather Forecaster*". These exhibits will tour the province of Nova Scotia starting in January 1996. The travelling version of "*The Weather Forecaster*" has been ported to a 486 PC running the linux operating system. This ported version of the original exhibit will present a case study of a weather system instead of real-time forecasting because of the lack of Internet access at all travel sites.

In most other aspects the travelling exhibit is very similar to the original. We have also considered implementing another version of the exhibit which could be made accessible to the public schools via Environment Canada's Internet server in Bedford, N.S. If colleagues in other regions of the country are interested in porting the exhibit for use in their region, we would welcome the inquiries.

## Acknowledgments

"*The Weather Forecaster*" project was made possible through a collaboration of Environment Canada (Atlantic Region), Department of Fisheries and Oceans (Bedford Institute of Oceanography), Hewlett-Packard Canada Limited, and Discovery Centre. In addition the following individuals contributed greatly to the success of the project: Chuck Munro and Doug Fraser of Hewlett-Packard Canada Limited; Fred Karg, Al MacAfee, Bruce MacDonald, Jack Sadubin, Steve Miller, Doug Steeves, and Curtis Walmboldt of Environment Canada, and Gerhard Stroink of Dalhousie University. A special acknowledgment goes to the Atmospheric Sciences Group at the University of Illinois at Urbana-Champaign for providing the on-line weather textbook.

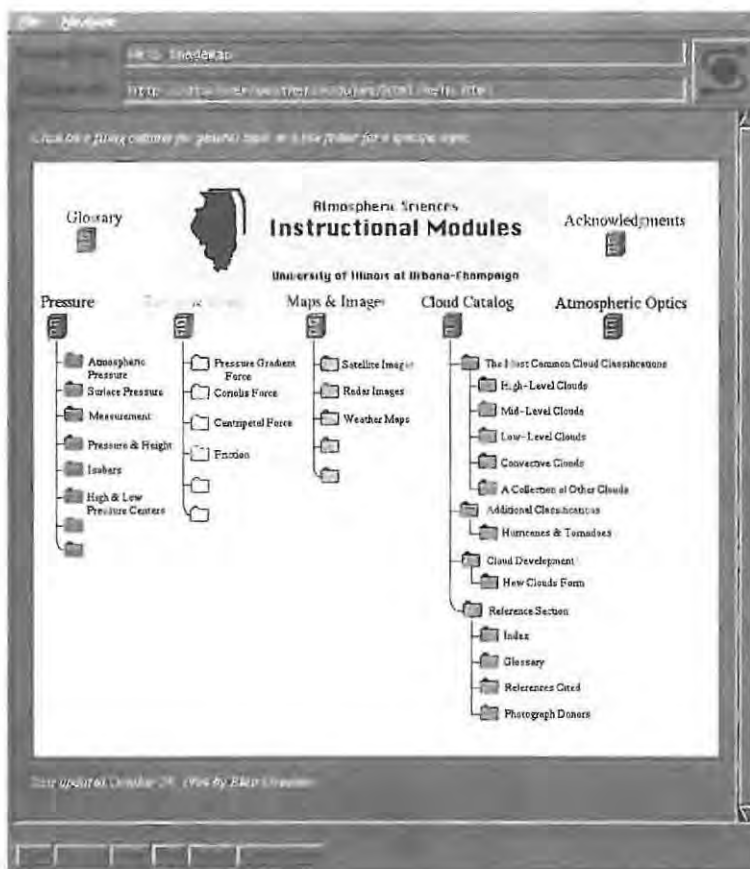


Figure 1: The clickable imagemap used to present the table of contents of the on-line weather textbook produced by the University of Illinois at Urbana-Champaign. The user navigates by single-clicking in the appropriate filing cabinet or folder.

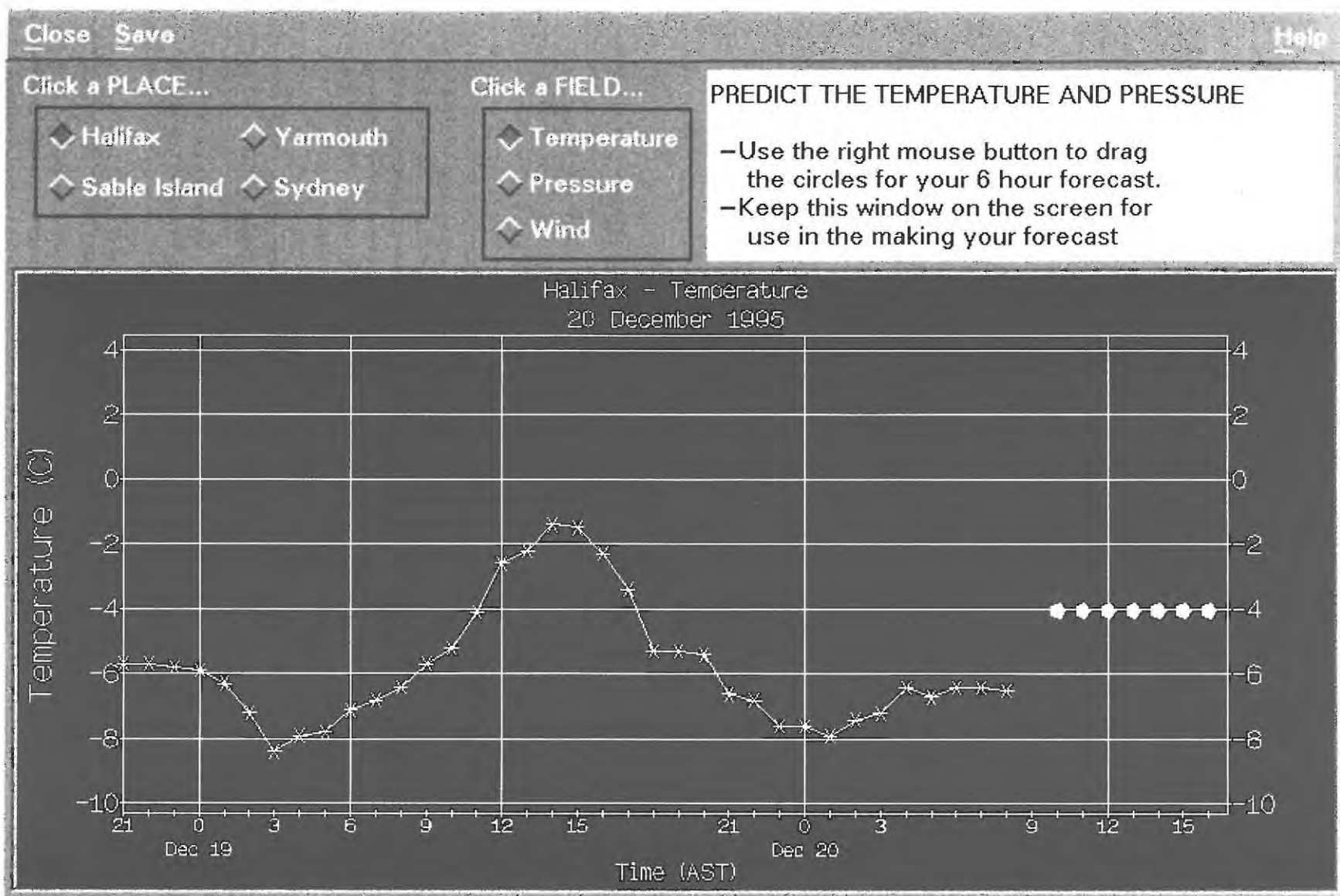


Figure 2: Screen-shot of a custom HP *Starbase Graphics* program which plots local temperature, pressure and wind for Halifax, Yarmouth, Sydney and Sable Island, Nova Scotia. The filled circles on the right side of the graph are movable, allowing the user to draw in the future trend for the variable.



## CMOS OTTAWA CENTRE ACTIVITIES

The Ottawa Centre resumed its luncheon meeting activities after the summer recess with an interesting and informative talk by Eddy Carmack (IOS) on 27 September 1995. He related his experiences and scientific determinations resulting from last summer's expedition across the Arctic Ocean in the icebreaker CCGS Louis St. Laurent, in company with the USCGS Polar Star. The second meeting, 18 October, was a review of human interference with global climates by the well-known Greenhouse gas expert, Henry Hengeveld from AES Downsview. In November, Denis Bourque from AES Ottawa, spoke on Weather and health (It's your Health, Weather or Not). Video clips from this presentation were shown on the CBC news that evening. The 1995 program year ended with a hot Christmas luncheon on December 12 at which Geoff Holland of DFO and Chairman of the IOC revealed the mysteries surrounding the acronyms and work of the Intergovernmental Oceanographic Commission. The first meeting of the new year was held on 17 January, 1996 with an interesting presentation "Stratospheric ozone science and monitoring" by Jim Kerr from Environment Canada in Downsview. Future speakers will include Al Clarke from BIO on The Oceanography of the Newfoundland Basin, Howard Edel on oceanography using RADARSAT, and the CMOS tour speaker.

The Ottawa Centre meetings are normally preceded by a meeting of the Centre Executive and usually take place mid-month on Wednesdays in the Royal Canadian Air Force Officers Mess, 158 Gloucester St. at noon. Depending on weather and other circumstances, the meetings are attended by some 30-50 members. The next meetings are scheduled for 21 Feb, 13 Mar and 17 April. If you're going to be in the area and would like to attend our meeting, call or E-mail for confirmation of the dates. Visitors are always welcome.

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## New CMOS Members Nouveaux membres de la SMO

Dr. Eric Ursulines	Centre de Rimouski	Régulier
Mr. Jodi-Ken Nakahara	Toronto Centre	Student
Mr. José A. Vergara	US & International	Regular

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## REPORT OF THE CMOS COUNCIL

by Louis Lefavre and Neil Campbell

The CMOS Council, elected at the 1995 Congress, has met monthly since August. Dr. Peter Bartello and Dr. Dan Wright were approved by Council as the new editors of Atmosphere-Ocean, replacing Drs. Charles Lin and Peter Smith who have served the Society as editors of A-O for the past two years. Their dedication of time and effort is very much appreciated in maintaining the high standards of the journal, and the Council is deeply indebted to them. Both Charles and Peter will continue on the Editorial Board of A-O thus giving us some experienced back-up. Their replacements, Peter for meteorology, and Dan for oceanography, may not be well known to all members of the Society, but their biographies will be published in the next issue of the Bulletin. To complete the A-O changes, Sheila Bourque was appointed Technical Editor of A-O and the December issue of A-O is her inaugural issue. Sheila's biography will also be published in the Bulletin. Last but not least, the Council re-affirmed Gilles Tardif as the translator of the Abstracts for A-O. As you will soon see in his biography, Gilles has been around for quite a few years.

Following Ambury Stuart's successful work in achieving the acceptance of the exemption clause for natural scientists by the Canadian Council of Professional Engineers, a similar effort has been launched in the Province of Quebec through l'Association professionnelle des météorologistes du Québec.

Council is pleased to report that approval was granted to the Saskatchewan Centre to host the 1997 Congress. Dr. Geoff Strong, the Chair of the Centre, will handle the chores of the Scientific program coordinator for the Congress.

CMOS was invited to present a brief to the House of Commons Standing Committee on Fisheries and Oceans on October 26, 1995. The Society was represented by Dr. Lawrence Mysak, McGill University, and Neil Campbell. The brief (see "Canada Oceans Act" in this issue) was well-received.

Council has been working on a survey which is expected to be mailed out shortly to members. The survey covers a number of issues on which your views are being sought for the preparation of the annual letters to the Deputy Ministers of the Departments of Environment and Fisheries and Oceans.

Council also gave the go-ahead to the CMOS Executive Director for the preparation of a CMOS Home Page on Internet. Dr. Peter Zwack, CMOS vice-president, chairs an ad hoc committee that is working out the details. The first draft of the Home Page is scheduled to be up and running

in January 1996.

## The Canada Oceans Act

On November 7, 1995 Dr. Lawrence Mysak, McGill University and Dr. Neil Campbell, Executive Director of CMOS, presented a CMOS brief to the House of Commons Standing Committee on Fisheries and Oceans on their review of the Oceans Act, Bill C-98. Prior to the meeting, Members of the Commons Committee were given a background document on the Society, its organization, and role in promoting atmospheric and oceanographic sciences in Canada through conferences, publications, youth science fairs and professional services.

Ample time was given to CMOS for its presentation. Both Dr. Mysak and Dr. Campbell stressed the significance of the Oceans Act in promoting the understanding of the oceans, ocean processes, marine resources and marine ecosystems. The role of ocean sciences with respect to the living resources within the exclusive economic zone is clearly and strongly identified in the Act. Dr. Mysak urged the Committee to recognize, as well, the larger and broader implications of ocean research for the stewardship of global oceans and global climate change. Through examples, he illustrated how important it was for Canada to remain an active player in the field of international ocean science. Dr. Mysak suggested an additional paragraph to the Act to recognize these points, i.e. "conduct systematic assessments and research on the role of marine waters, in the Canadian area of interest, as part of the global climate system".

It was also noted that the Act omitted provisions for the Minister to consult or seek external advice in the conduct of marine research; CMOS proposed an addition to one of the articles which, in effect, calls on the Minister "to establish marine science advisory bodies and appoint or designate, as appropriate, members of these bodies".

A number of other points were made in regard to clarification of text. CMOS suggested that the terms "estuary" and "hydrography" be included and defined in the Act. Definitions of both were submitted by CMOS for consideration by the Committee.

Neil J. Campbell

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**If you have moved and lost track of your CMOS colleagues, let us know and we will do the rest.**

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# Hydrology Special Interest Group Report of their Meeting

May 31, 1995  
in Kelowna, British Columbia

## 1. Need for a Hydrology SIG

A lively discussion arose on the issue of the role and value of the Hydrology SIG. Reasons for dissolving the SIG appear to include the lack of active interest in HYSIG activities by the majority of its members, and the maturation and success of the Hydrological Sciences Division within the CGU that now meets most of the needs of hydrologists for a forum within which to discuss the hydrological sciences.

However, a number of good reasons for continuing the SIG were also brought forward. In particular, it was noted that the SIG could assist in organizing a possible joint CMOS/ CGU Congress anticipated in 1997 where meteorologists, oceanographers and hydrologists would be meeting. Conceptually, there is a need for a hydrological component within CMOS because our Society needs to have this expertise when commenting on or otherwise addressing the scientific aspects of global and national water issues such as GEWEX. Furthermore, regional integration within Environment Canada has now brought hydrologists and meteorologists together organizationally to deliver Environment Canada's regional programs. CMOS, through HYSIG, could provide a very effective forum for discussions of the science needed to support these programs. After some discussion it was **agreed that the Hydrology SIG should continue until the 1997 Congress, when its status would be reviewed.**

## 2. Activities for the Coming Year

After some discussion it was agreed that the following actions should be undertaken in the coming year:

a) a special session will be planned for the upcoming Toronto Congress. Furthermore, the theme in this session should deal with advances in the hydrometric data collection networks. Mert Horito and his colleague will look into the possibility of organizing this session on behalf of the Hydrology SIG.

b) Dr. Jim Bruce will prepare a writeup on the results of the CWRA/RS Water Research Project for the CMOS Bulletin.

c) Minutes from the 1995 HYSIG general meeting will be submitted to the CMOS Bulletin.

## 3. Election of Officers

As a result of the discussion at the meeting the following slate of officers was unanimously accepted (subject to the nominees receiving approval from their management):

Chair: Dr. Terry Krauss; Vice-chair: Dr. Geoff Strong; Secretary: Ron Hopkinson; Councillor at Large: Jim Bruce

## 4. Information Items

a) The CWRA/ Royal Society Water Research Project: Dr. Jim Bruce reviewed recent progress in the CWRA survey of research needs related to water management. He noted that a draft paper had been circulated and comments were invited until June 8. The deadline for the final report is the end of June 1995.

b) Mert Horito and his colleague reported on the status of hydrometric observing networks in the Pacific and Yukon region and their increased responsibilities for providing input for planning these networks. Concern was expressed that Environment Canada's Program Review may have inadvertently targeted the hydrometric network too heavily and that irreparable damage could be done to Canada's data archives and water management programs as a result.

Report prepared by Rick Lawford,  
GCIP Project Manager, Silver Spring, MD

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## ELECTION of the COUNCIL 1996/97

The elected officers to Council are the President, the Vice-President, the Treasurer, the Corresponding Secretary, the Recording Secretary, and three Councillors-at-Large. Only members in good standing are eligible to hold office in the Society. Nominations in writing from the memberships will be accepted by the Recording Secretary up to May 1st, 1996, provided:

- i) that the nominee is eligible for the office for which he is nominated;
- ii) that the nominee acknowledges, by signing the nomination, for his willingness to accept office if elected; and,
- iii) that the nomination is signed by four members, in addition to nominee and the member making the nomination.

Nominations can be mailed to:

M. Louis Lefavre, (E-Mail: llefavre@cmc.aes.doe.ca)  
Secrétaire d'assemblée de la SCMO  
Environnement Canada, Centre météorologique canadien  
2121, Voie de service Nord, Route Transcanadienne  
Dorval, Qc, H9P 1J3  
Tél: (514) 421-4789; Télécopieur: (514) 421-4600

## Projet de loi concernant les océans

Le Dr. Lawrence Mysak, de l'université McGill, et le Dr. Neil Campbell, directeur exécutif de la SCMO, ont présenté, le 7 novembre 1995, un rapport de la SCMO au comité permanent des pêches et océans de la Chambre des communes sur leur examen du projet de loi concernant les océans, le Bill C-98. Avant la rencontre, les membres du comité de la Chambre ont reçu un document traitant de l'histoire de la Société, de son organisation et du rôle qu'elle joue dans la promotion des sciences atmosphériques et océanographiques au Canada par ses conférences, ses publications, les expositions scientifiques jeunesse et ses services professionnels.

La SCMO a eu amplement le temps de faire sa présentation. Le Dr. Mysak et le Dr. Campbell ont tous deux insisté sur l'importance du projet de loi concernant les océans dans la promotion de la compréhension des océans, des processus océanographiques, des ressources marines et de l'écosystème marin. Le rôle des sciences de l'océan en ce qui concerne les ressources vivantes à l'intérieur de la zone économique exclusive est clairement identifié dans le projet de loi. Le Dr. Mysak a recommandé au Comité de reconnaître également l'implication grandissante de la recherche océanographique dans la protection des océans mondiaux et dans le changement climatique mondial. Par des exemples, il a démontré pourquoi il est important que le Canada demeure actif dans le domaine des sciences des océans internationaux. Le Dr. Mysak a suggéré un alinéa supplémentaire au projet de loi afin de reconnaître ces points, c.-à-d. «mener des évaluations et des recherches systématiques sur le rôle des eaux marines, dans le domaine d'intérêt du Canada, en tant que partie du système climatique mondial.»

Il a également été noté que le projet de loi avait omis d'inclure que le ministre devrait consulter ou demander des avis à l'externe pour ce qui est de la conduite en matière de recherche marine. La SCMO a également proposé d'ajouter dans une des sections que le ministre, en effet, «mette sur pied des conseils consultatifs sur la science marine et de nommer les membres de ces conseils».

Plusieurs autres points ont été soulevés en ce qui concerne la clarification du texte. La SCMO a suggéré que les termes «estuaire» et «hydrographie» soient inclus et définis dans le projet de loi. Des définitions de ces termes ont été remis par la SCMO pour étude par le Comité.

Neil J. Campbell

## Rapport du Conseil de la SCMO

par Louis Lefavre et Neil Campbell

Le Conseil de la SCMO, élu au Congrès de 1995, s'est rencontré mensuellement depuis le mois d'août. Le Conseil a ratifié les nominations du Dr. Peter Bartello et de Dr. Dan Wright aux postes de co-directeurs scientifiques d'Atmosphère-Océan, en remplacement des Drs. Charles Lin et Peter Smith qui ont servi la Société comme directeurs d'A-O depuis les deux dernières années. Leur dévouement en temps et efforts est très apprécié pour le maintien de hauts standards de la revue. Le Conseil leur en est très reconnaissant. Charles et Peter continueront tous deux à siéger à la rédaction d'A-O, nous donnant ainsi un soutien d'expérience.

Leurs remplaçants, Peter, à la météorologie, et Dan, à l'océanographie, ne sont peut-être pas très connus des membres de la Société, mais vous pourrez très bientôt lire leurs biographies dans un prochain numéro du Bulletin. Afin de compléter les changements à A-O, Sheila Bourque a été nommée rédactrice technique d'A-O et le numéro de décembre d'A-O est son numéro inaugural. Vous pourrez également lire la biographie de Sheila dans un prochain numéro du Bulletin. Finalement, le dernier mais pas le moindre, Gilles Tardif a été ré-élu par le Conseil comme traducteur des résumés d'A-O. Comme vous pourrez très bientôt le constater en lisant sa biographie, Gilles est parmi nous depuis plusieurs années.

Suite au travail fructueux d'Ambury Stuart dans l'acceptation de la clause d'exemption des scientifiques naturels par le Conseil canadien des ingénieurs, un effort semblable vient d'être lancé au Québec par l'Association professionnelle des météorologistes du Québec.

Le Conseil est heureux d'annoncer qu'il a accepté que le Centre de la Saskatchewan soit l'hôte du congrès de 1997. Le Dr. Geoff Strong, président du centre, prendra en main la coordination du programme scientifique pour le congrès.

Le 26 octobre 1995, la SCMO a été invitée à présenter un document au Comité permanent des pêches et océans de la Chambre des communes. La Société était représentée par le Dr. Lawrence Mysak, de l'Université McGill, et Neil Campbell. Le document (voir "Le projet de loi concernant les océans" dans ce numéro) a été bien reçu.

Le Conseil prépare un sondage qui devrait être envoyé sous peu à nos membres. Ce sondage couvre plusieurs domaines pour lesquels nous aimerions avoir votre point de vue pour préparer les lettres envoyées annuellement aux sous-ministres du ministère de l'Environnement et du ministère des Pêches et océans.

(Voir suite au bas de la page 15)

## Call for Papers CMOS Thirtieth Annual Congress

The 30th Annual Congress of the Canadian Meteorological and Oceanographic Society will be held at the University of Toronto, Toronto, Ontario, Canada, from May 26 to May 31, 1996.

Oral and poster papers, and commercial exhibits in all areas of meteorology, oceanography and limnology are invited. Special interdisciplinary sessions will be held on: Arctic research, surface processes, remote sounding, mesoscale processes, and radiation and climate. A special session is also planned on the Climate Research Network.

Abstracts of papers must be received by the Scientific Program Committee (Chair, Dr. T.G. Shepherd) by 5:00pm, Monday, February 26th, 1996. Authors are strongly urged to submit abstracts by electronic mail. A template for sending an electronic abstract can be obtained by sending a (blank) e-mail message to: [cmos\\_form@atmosp.physics.utoronto.ca](mailto:cmos_form@atmosp.physics.utoronto.ca) or by anonymous ftp from [chinook.physics.utoronto.ca](ftp://chinook.physics.utoronto.ca) (128.100.80.27), file `pub/cmos/abstracts/form`. The committee would greatly appreciate all efforts to submit abstracts electronically using the template as this will accelerate the approval and printing process and therefore reduce our costs. If you cannot submit by e-mail, please contact Dr. Shepherd for information on other methods for submitting abstracts.

### List of Sessions (Preliminary):

1. Air Quality
2. Arctic Research
3. Aviation Meteorology
4. Atmospheric Chemistry
5. Atmospheric Dynamics
6. Atmospheric Modelling
7. Atmospheric and Oceanic Waves
8. Boundary Layer Meteorology
9. Chemical Oceanography and Limnology
10. Client and Commercial Services
11. Climate and Paleoclimate
12. Climate Research Network
13. Cloud and Precipitation Dynamics
14. Coastal Ocean and Inland Waters
15. Data Assimilation
16. Deep-Sea Research
17. Fisheries and Biological Oceanography
18. Geophysical Fluid Dynamics
19. GEWEX
20. Hydrology

21. Interannual Variability
22. JGOFS
23. Long-Range Forecasting
24. Mesoscale Processes
25. Middle Atmosphere
26. Ocean Circulation
27. Radar Meteorology
28. Radiation and Climate
29. Remote Sensing
30. Remote Sounding
31. Sea Ice
32. Surface Processes
33. Weather Forecasting
34. WOCE
35. Other

The scientific program is expected to run from May 27-30 inclusive; Sunday, May 26 will be set aside for committee meetings, and Friday, May 31 will be set aside for special workshops.

For further information on the scientific program, contact: Dr. T.G. Shepherd, Scientific Program Committee, Department of Physics, University of Toronto, 60 St. George Street, Toronto, Ontario, M5S 1A7  
Fax: (416) 978-8905  
E-Mail: [cmos\\_science@atmosp.physics.utoronto.ca](mailto:cmos_science@atmosp.physics.utoronto.ca)

For further information on registration, accommodation and commercial exhibits, contact: Dr. D. Hudak, Local Arrangements Committee, Department of Physics, University of Toronto, 60 St. George Street, Toronto, Ontario, M5S 1A7, Fax: (416) 978-8905  
E-Mail: [cmos\\_arrangements@atmosp.physics.utoronto.ca](mailto:cmos_arrangements@atmosp.physics.utoronto.ca)

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**Ne manquez pas le prochain Congrès de la SCMO à Toronto. Réservez dès maintenant les dates du 26 au 31 mai à votre agenda.**

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### Suite du Rapport du Conseil de la SCMO

Le Conseil a également accordé le feu-vert au directeur exécutif de la SCMO pour la préparation de la page d'accueil de la SCMO sur Internet. Le Dr. Peter Zwack, vice-président de la SCMO, présidera un comité ad hoc qui mettra au point les détails. La première ébauche de la page d'accueil est prévue pour janvier 1996.



## Invitation à présenter des communications Trentième congrès annuel de la SCMO

Le 30e Congrès annuel de la Société canadienne de météorologie et d'océanographie se tiendra à l'Université de Toronto, Toronto, Ontario, Canada du 26 au 31 mai 1996.

Les présentations orales et écrites ainsi que les expositions commerciales sur les thèmes de la météorologie, de l'océanographie et de la limnologie. Des sessions spéciales interdisciplinaires se tiendront sur la recherche arctique, les processus de surface, le télésondage, les processus à mésoéchelle et le rayonnement et le climat. Une session spéciale est également prévue sur le Réseau de recherche climatique (Climate Research Network).

Les résumés de présentation doivent parvenir au Comité du programme scientifique (président, Dr. T.G. Shepherd) avant 17:00 heure, le lundi 26 février 1996. Nous recommandons fortement aux auteurs de soumettre leur résumé par courrier électronique. Un modèle pour transmettre un résumé électronique peut être obtenu automatiquement en envoyant un message (blanc) électronique à [cmos\\_form@atmosp.physics.utoronto.ca](mailto:cmos_form@atmosp.physics.utoronto.ca) ou par protocole de transfert de fichier anonyme à [chinnook.physics.utoronto.ca](mailto:chinnook.physics.utoronto.ca) (128.100.80.27), fichier [pub/cmos/abstracts/form](http://pub/cmos/abstracts/form). Le comité apprécierait grandement que tous les efforts possibles soient déployés pour soumettre vos résumés par courrier électronique en utilisant ce modèle puisque cela accélérera le processus d'acceptation et d'impression et ainsi réduira nos coûts. Si vous ne pouvez utiliser le courrier électronique, veuillez contacter le Dr. Shepherd qui vous donnera les renseignements nécessaires pour soumettre votre résumé d'une autre façon.

### Liste préliminaire des sessions:

1. Qualité de l'air
2. Recherche arctique
3. Météorologie aéronautique
4. Chimie de l'atmosphère
5. Dynamique de l'atmosphère
6. Modélisation de l'atmosphère
7. Vagues océaniques et atmosphériques
8. Météorologie de la couche limite
9. Océanographie chimique et limnologie
10. Services aux clients et commerciaux
11. Climat et paléoclimat
12. Réseau de recherche climatique
13. Dynamique des nuages et des précipitations
14. Océan côtier et eaux intérieures
15. Assimilation des données
16. Recherche au haute mer
17. Océanographie biologique et des pêches

18. Dynamique géophysique des fluides.
19. GEWEX
20. Hydrologie
21. Variabilité interannuelle
22. JOGFS
23. Prévisions à long terme
24. Processus à mésoéchelle
25. Atmosphère moyenne
26. Circulation océanique
27. Météorologie radar
28. Rayonnement et climat
29. Télédétection
30. Télésondage
31. Glaces de mer
32. Processus de surface
33. Prévision météorologique
34. WOCE
35. Autre

Le programme scientifique doit avoir lieu du 27 au 30 mai inclusivement. Les réunions du comité auront lieu le dimanche 26 mai et les ateliers spéciaux auront lieu le vendredi 31 mai.

Pour plus de renseignements sur le programme scientifique, veuillez contacter:

Dr. T.G. Shepherd, Comité du Programme Scientifique,  
Département de physique, Université de Toronto,  
60 St. George Street, Toronto, ON, M5S 1A7  
Télécopieur.: (416) 978-8905

courrier électronique:

[cmos\\_arrangements@atmosp.physics.utoronto.ca](mailto:cmos_arrangements@atmosp.physics.utoronto.ca).

Pour plus de renseignements sur l'inscription, le logement et les exhibits commerciaux, veuillez contacter:

Dr. D. Hudak, Comité des arrangements locaux,  
Département de physique, Université de Toronto,  
60 St. George Street, Toronto, ON, M5S 1A7  
Télécopieur.: (416) 978-8905

courrier électronique:

[cmos\\_arrangements@atmosp.physics.utoronto.ca](mailto:cmos_arrangements@atmosp.physics.utoronto.ca).

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**Don't miss the next CMOS Congress  
in Toronto. Reserve now the dates 26  
to 31 May in your agenda.**

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## NEWLY BORN CANADIAN SATELLITE: RADARSAT

Summary prepared by Paul-André Bolduc

RADARSAT is a Canadian satellite program involving the private sector, the provinces and the United States. Launched the 4<sup>th</sup> of November 1995 at 6:22 PST by a Delta II rocket from Vandenberg, California, this sophisticated remote sensing satellite has a Synthetic Aperture Radar (SAR), a powerful microwave instrument able to transmit and receive signals through clouds, fog, smoke and darkness, and obtain high-quality images of the Earth in all weather. Being the first Canadian Earth observation satellite, it is used to monitor and map renewable resources for the agricultural and forestry industries. RADARSAT gathers data essential for more efficient resource management, ice, ocean and environmental monitoring, and Arctic and offshore surveillance. RADARSAT also supports fishing, shipping, oil exploration, offshore drilling and ocean research.

RADARSAT's SAR can capture data for up to 28 minutes and image up to 1.1 million square kilometres of the Earth's surface with each orbit. In order to serve commercial and international users, data are downlinked in real time or stored on one of the two tape recorders until the spacecraft is within range of a receiving station. Each tape recorder can store up to 10 minutes of SAR data. To satisfy user requirements for timely data, RADARSAT's processing system can deliver data to users within hours of scene acquisition.

In Canada and the United States, RADARSAT data are downlinked to ground stations located in Prince Albert, Saskatchewan, Gatineau, Québec, and Fairbanks, Alaska. Additional RADARSAT SAR data reception and processing capability will be added as other countries join the international RADARSAT ground station network.

A private corporation, RADARSAT International (RSI), was established in 1989 to process, market and distribute RADARSAT data to Canadian and international commercial users. In cooperation with the Canadian Space Agency, RSI is developing commercial applications, negotiating international reception and distribution agreements for RADARSAT data, and supplying Canada with an upgraded system to process RADARSAT data. RSI also pays royalties on commercial sales of RADARSAT data and these are used to offset operating costs of the system.

RADARSAT products offer users a choice of resolutions and formats. RADARSAT data are available through satellite programming or from the archive catalogue. A

number of programming, processing and delivery services are offered to meet a wide variety of user requirements. Data are available on a variety of digital and hard copy media including computer compatible tape (CCT), CD-ROM, data cartridges, film and prints.

As an important source of remotely sensed data, RADARSAT will be used by decision-makers in various fields including:

Ice Reconnaissance;	Coastal surveillance;
Oceanography;	Cartography;
Geology;	Environmental monitoring;
Hydrology;	Agriculture;
Forestry;	Disaster response and mitigation.

Many professionals in the above-mentioned disciplines already use Geographic Information System (GIS) to integrate and analyze large amounts of data from a variety of sources. RADARSAT will supply these users with another valuable source of resource and environmental information. Depending on the application, RADARSAT data will serve end users in three ways: as a stand-alone source of new information; as a complement to other remotely sensed data; or as a replacement for existing data.

To find out more about RADARSAT and its many applications, contact:

Canadian Space Agency Communications  
6767, route de l'Aéroport  
Saint-Hubert, Québec J3Y 8Y9  
Tel: (514) 926-4351 Fax: (514) 926-4352  
E-Mail: coord@radarsat.space.gc.ca

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**Why not become a contributor to the Bulletin? We can use notes, interesting anecdotes, photographs, contributions, scientific papers, articles and presentations on any meteorological or oceanographic subject.**

**It is your Bulletin - get busy, sharpen your pencil, write something and send us your text on a computer diskette or via E-Mail! Look for details on page ii.**

## UN NOUVEAU NÉ PARMIS LES SATELLITES CANADIENS: RADARSAT

Sommaire écrit par Paul-André Bolduc

RADARSAT est un satellite canadien auquel participe le secteur privé, plusieurs provinces et les États-Unis. Mis en orbite le 4 novembre 1995 à 06:22 HSP par une fusée Delta II qui a décollé de la base de Vandenberg, Californie, ce satellite de télédétection perfectionné possède un radar à ouverture synthétique (ROS), un puissant instrument de micro-ondes qui transmet et reçoit des signaux à travers les nuages, le brouillard, la fumée et dans l'obscurité et qui permet d'obtenir des images de haute qualité de la Terre. Étant le premier satellite canadien d'observation terrestre, il permettra de surveiller et de cartographier les ressources agricoles et forestières renouvelables, les richesses naturelles, le mouvement des glaces, les océans incluant l'océan Arctique et les zones hauturières. RADARSAT permettra également d'appuyer la pêche, la navigation, l'exploitation pétrolière, le forage au large des côtes et la recherche en mer.

Le ROS de RADARSAT peut recueillir des données pendant une période maximale de 28 minutes à chacune de ses orbites pour fournir des images de la surface de la Terre sur une superficie d'un maximum de 1,1 million de kilomètres carrés. Afin de desservir les utilisateurs commerciaux et internationaux, les données sont transmises en liaison descendante en temps réel ou stockées sur l'un des deux enregistreurs sur bande du système, jusqu'à ce que le satellite soit en vue d'une station de réception. Afin de satisfaire aux besoins des utilisateurs qui désirent obtenir des données rapidement, le système de traitement de RADARSAT peut livrer les données dans les heures qui suivent l'observation d'une scène.

Au Canada et aux États-Unis, les données de RADARSAT sont transmises aux stations terrestres situées à Prince-Albert (Saskatchewan), Gatineau (Québec) et à Fairbanks (Alaska). Des installations supplémentaires seront ajoutées au fur et à mesure que les stations terrestres d'autres pays s'ajouteront au réseau international de distribution.

RADARSAT International Inc. (RSI), une entreprise privée créée en 1989, a pour mandat de traiter, de commercialiser et de distribuer les données RADARSAT aux utilisateurs commerciaux du Canada et d'ailleurs. De concert avec l'Agence spatiale canadienne, RSI participe à la recherche et au développement d'applications commerciales en dotant le Canada d'un système plus évolué de traitement des données et en négociant des accords de réception et de distribution des données. Les redevances payées par RSI à l'Agence spatiale couvriront les frais d'opération du système.

Les produits de données RADARSAT sont structurés de façon à offrir aux utilisateurs un choix de résolutions et de formats. Pour répondre aux besoins des utilisateurs, les données peuvent être présentées sur divers supports, dont le ruban magnétique, la pellicule, l'imprimé, le CD-ROM, les cassettes de bande magnétique exaocet.

Cette nouvelle source de données de télédétection fournies par RADARSAT pourra être utilisée par les décideurs dans de nombreux domaines, dont:

reconnaissance des glaces;	surveillance des côtes;
océanographie;	cartographie;
hydrologie;	exploitation forestière;
surveillance environnementale;	géologie;
agriculture;	réponse aux désastres;

Plusieurs professionnels de ces disciplines ont déjà recours aux Systèmes d'information géographique (SIG) pour intégrer et analyser de grandes quantités de données provenant de sources diverses. RADARSAT fournira à ces utilisateurs une autre source utile d'informations sur les ressources et l'environnement. Selon l'application choisie, les données RADARSAT aideront les utilisateurs de trois façons: d'abord comme source autonome d'informations nouvelles; ensuite comme complément aux autres sources de données de télédétection; puis, enfin, comme méthode d'imagerie de remplacement.

Pour de plus amples renseignements à propos de RADARSAT et de ses multiples applications, s'adresser à:

Agence spatiale canadienne  
6767, route de l'Aéroport  
Saint-Hubert (Québec) J3Y 8Y9  
Tél: (514) 926-4406  
Télécopieur: (514) 926.4433  
Courrier électronique: coord@radarsat.space.gc.ca

Saviez-vous que l'Agence spatiale canadienne a pour mandat de promouvoir l'exploitation et l'usage pacifique de l'espace, de faire progresser les connaissances de l'espace au moyen de la science et de faire en sorte que les Canadiens tirent profit des sciences et de la technologie spatiales sur les plans tant social qu'économique.

Did you know that the mandate of the Canadian Space Agency is to meet Canadian needs in Earth observation and telecommunications and to develop a strong and internationally-competitive industry.



**UNIVERSITY OF TORONTO  
DEPARTMENT OF PHYSICS  
TENURE TRACK FACULTY POSITION**

**Experimental Atmospheric Physics  
Remote Sounding from Space**

The Department of Physics plans to make a tenure track appointment at the Rank of Assistant Professor in the above area, with a starting date of July 1, 1996 or as soon as possible thereafter. Salary will be commensurate with qualifications and experience.

The ideal candidate will possess a Ph.D. in Physics and some Post-doctoral experience. He or she will exhibit excellence in both the teaching of atmospheric physics, and research in the area of remote sounding of planetary atmospheres using space-based instrumentation. Current research projects in the department are in the areas of sounding of the troposphere and the middle atmosphere and this area of research is being expanded.

Applications, including a curriculum vitae and three letters of reference, should be sent to Professor, D. York, Chair, Department of Physics, University of Toronto, Toronto, Ontario, CANADA, M5S 1A7. The deadline for the receipt of applications and letters of reference is Friday, April 26<sup>th</sup>, 1996.

The University of Toronto is committed to employment equity and encourages applications from qualified women and men, members of visible minorities, aboriginal persons, and persons with disabilities.

In accordance with Canadian immigration requirements this advertisement is directed to Canadian citizens and permanent residents.

**UNIVERSITY OF TORONTO  
DEPARTMENT OF PHYSICS  
CONTRACT-LIMITED FACULTY  
APPOINTMENT**

**Atmospheric Remote Sounding from Space**

The Department of Physics plans to make a term appointment of up to five years duration in the above area, with a starting date of July 1, 1996 or as soon as possible thereafter. Salary will be commensurate with qualifications and experience.

The ideal candidate will possess a Ph.D. in a relevant area. The candidate will undertake teaching and research activities in the Atmospheric Physics Group working with the holder of the NSERC Industrial Chair in Atmospheric Remote Sounding from Space. Potential areas of research include, space instrument testing (including testing of the MOPITT instrument currently under construction), instrument design, atmospheric spectroscopy, data processing and global data analysis.

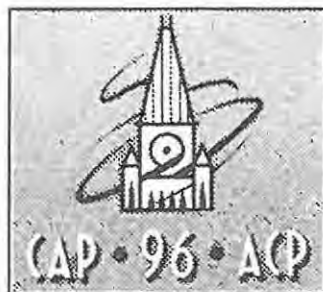
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The University of Toronto is committed to employment equity and encourages applications from qualified women and men, members of visible minorities, aboriginal persons, and persons with disabilities.

In accordance with Canadian immigration requirements this advertisement is directed to Canadian citizens and permanent residents.

**Call for Papers  
Canadian Association of Physicists  
51<sup>st</sup> Annual Congress**

*Abstract deadline:  
15 March 1996*



**Appel de résumés  
Association canadienne des physiciens et  
physiciennes  
51<sup>e</sup> Congrès annuel**

*Date limite pour résumés:  
15 mars 1996*

## COASTAL ZONE CANADA '96

### International Conference on Integrated Management and Sustainable Development in Coastal Zones

*Rimouski, Québec, Canada  
12-17 August 1996*

This International Conference is the second in the continuing inter-disciplinary series begun in 1994 in Halifax, Nova Scotia. We invite you to participate in Coastal Zone Canada '96 (CZC'96) to be held in Rimouski, Québec, Canada, on 12-17 August 1996. The theme of the conference is "Integrated Management and Sustainable Development in Coastal Zones". The conference will have the following objectives:

- 1) To review the development and knowledge - both theoretical and practical - of the coastal zones, including the scientific, managerial, social and economics aspects, since CZC'94 Conference held in Halifax in September 1994.
- 2) To achieve this review by bringing together representatives of governmental, academic, business and coastal communities and other interest groups involved in the management, development and use of coastal zones.
- 3) To frame recommendations arising from the deliberations of the conference and to outline new research and management directions. Such advice will be forwarded to Governments to contribute to the formation of strategies for the integrated management and sustainable developments of coastal zones under their national jurisdiction.

Papers and case study presentations are invited from national and international coastal zone stakeholders, community-based organizations, scientists and engineers, governments and primary resource users, industry and business. This international conference will feature oral and poster presentations, plenary panel sessions and round-table discussions in the following subject areas:

- Scientific Tools for Monitoring, Classification, Surveillance and Management of Coastal Environments;
- Environmental Quality, Pollution Impacts and Coastal Oceanography;
- Climate Change, Sea Level Rise and Natural Disaster Impacts;

- Cultural, Socio-Economic and Political Considerations in Coastal Development;
- Legal Issues and Problem Solving in a Multi-Use Environment;
- Conservation and Protection of the Coastal Zone;
- Survival and Development of the Coastal Zone;
- Public and Formal Education in Coastal Zone Management;
- Promotion of Environmentally Sound Technology;
- Management and Development of Coastal Zone Resources;
- Coastal Zone Policy and Institutional Arrangements;
- Regional and International Issues;
- Agenda 21: A Vehicle for Action?

Other coastal subjects are encouraged. Proposals for round-table sessions are also invited.

Individuals wishing to submit a paper or poster for CZC'96 should send an abstract of no more than 300 words in either English or French to the Chair of the Scientific Committee, no later than 1 February 1996. Please ensure that your complete address, telephone and fax numbers are included. A computer diskette copy (Word Perfect, Word or ASCII format) of the abstract would be much appreciated. Notification of acceptance will be sent in February-March 1996.

The CZC'96 Conference will be held at the Université du Québec à Rimouski Campus and is organized by the Groupe de Recherche en Environnement Côtier (GREC), Université du Québec, jointly with the Coastal Zone Canada Association and Fisheries and Oceans Canada.

For more information or in order to receive the second announcement, please write to the Conference Chair, Mohammed El-Sabh, Groupe de recherche en environnement côtier (GREC), Université du Québec, 310 allée des Ursulines, Rimouski, Québec, Canada G5L 3A1. Tel.: (418) 724-1707; Fax: (418) 724-1842; InterNet: mohammed\_el\_sabh@uqar.quebec.ca.

## ZONE CÔTIÈRE CANADA '96

### Conférence internationale sur les zones côtières: gestion intégrée et développement durable

*Rimouski (Québec), Canada  
12-17 août 1996*

Nous vous invitons à participer à une grande conférence internationale sur la gestion de la zone côtière. Cette conférence multidisciplinaire se tiendra à Rimouski (Québec), Canada, du 12 au 17 août 1996 et aura pour thème "Les zones côtières: gestion intégrée et développement durable". Les objectifs de la conférence ZCC'96 sont:

1) Faire une revue de l'état actuel des connaissances théoriques et pratiques de la zone côtière, incluant les aspects scientifiques, économiques et sociaux et de l'évolution de celle-ci.

2) Fournir un forum en permettant un rassemblement d'intervenants de différents milieux gouvernementaux et universitaires, de l'industrie et d'autres groupes intéressés à l'aménagement, le développement et l'utilisation de la zone côtière.

3) Émettre des recommandations à partir des délibérations de la Conférence ZCC'96 afin que les gouvernements puissent les intégrer dans leurs stratégies de gestion intégrée et de développement durable en ce qui a trait aux zones côtières sous leurs juridictions. Établir de nouvelles directions de recherche.

Nous sollicitons des résumés et des études de cas portant sur les sujets à caractère national ou international et relatifs à la zone côtière ou à l'océan qui sont énumérés ci-après, ainsi que sur d'autres sujets traitant de la zone côtière et de l'océan. Les propositions de sujets pour les tables rondes sont aussi les bienvenues.

■ Outils scientifiques de contrôle, de classification, de surveillance et de gestion des zones côtières;

■ Qualité de l'environnement, incidence de pollution et océanographie côtière;

■ Changement climatique, élévation du niveau de la mer et catastrophes naturelles;

■ Considérations culturelles, socio-économiques et politiques;

■ Questions juridiques et résolution des conflits;

■ Développement, conservation et protection de la zone côtière et de ses ressources;

■ Collectivités côtières: survie et développement;

■ Éducation et formation;

■ Génie et technologie;

■ Expérience régionale et internationale en gestion des zones côtières;

■ Agenda 21: Le temps d'agir!

Ceux qui désirent soumettre une présentation orale ou écrite doivent envoyer un résumé d'au plus 300 mots, en anglais ou en français, au président du comité scientifique. Prière de fournir votre adresse postale et numéros de téléphone et de télécopieur. Les résumés doivent nous parvenir sur disquette d'ordinateur sous forme Word Perfect, Word ou ASCII. Les avis d'acceptation seront expédiés en février et en mars 1996.

La conférence internationale ZCC'96 se tiendra sur le campus de l'Université du Québec à Rimouski. Elle est organisée par le Groupe de recherche en environnement côtier (GREC) de l'Université du Québec en collaboration avec l'Association Zone Côtière Canada et Pêches et Océans Canada.

Pour obtenir d'autres informations concernant cet événement, vous devez écrire au président de la conférence, M. Mohammed El-Sabh, Groupe de recherche en environnement côtier (GREC), Université du Québec, 310 allée des Ursulines, Rimouski, Québec, Canada G5L 3A1. Tél.: (418) 724-1707; télécopieur: (418) 724-1842; ou par Courrier électronique: mohammed\_el\_sabh@uqar.quebec.ca.

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## PORSEC '96

### Pacific Ocean Remote Sensing Conference Ocean Science and Probing

August 13-16 1996

Victoria Conference Centre  
Victoria, B.C. Canada

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**Abstract Submission Deadline:  
February 29, 1996**

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**1997 Joint Assemblies  
IAMAS ■ IAPSO  
1 - 9 July  
Melbourne, Australia**

Invitation to attend

The internationalisation of science means that nowadays it is more important than ever before for scientists from different nations and disciplines to come together for discussions. Seven of the premier international scientific associations have decided to hold assemblies or symposia in Melbourne during July 1997. On behalf of these associations, you are invited to take part in these major events. The local organising committee will be working closely with the international groups to ensure that this will be a most scientific event.

The theme of the conference, Earth-Ocean-Atmosphere: Forces for Change, expresses the interconnectiveness of the geosphere with the atmosphere and oceans, and the way these dynamic interactions manifest themselves in temporal and spatial change under the influence of physical and social forces. Australia is a strong contributor to each of these areas of science. Melbourne, which provides a focus for Australian atmospheric science in particular, is a good place to hold such a meeting. It provides a convenient springboard for tours to nearby oceanographic and atmospheric research facilities as well as a base for visits to the unique Australian flora and fauna. You are invited to come and visit. This will be a productive and enjoyable time. Plan now to be down in Melbourne in July 1997.

Theme

The theme of the meeting will be **EARTH - OCEAN - ATMOSPHERE: FORCES FOR CHANGE** which reflects the present challenge facing the world's scientific community to respond to the pressure to provide relevant knowledge and relevant solutions to a public that is ever more concerned about changes to their natural environment.

Each of the international associations and commissions will be setting specific topics for workshops, symposia and sessions to tie their disciplinary input into the broad theme of the meeting.

Call for Papers

Information regarding topic areas, deadline for papers, authors' instructions, etc, can be obtained from the individual associations and commissions. Please direct your inquiry to the group representing your specific expertise. Only abstracts submitted in English can be

accepted.

Main Announcement

The main announcement and registration brochure, detailing accommodation venues, registration fees, social program and associated tours will be issued in August 1996. To obtain your copy please contact the meeting secretariat by fax, E-Mail or post.

IAMAS / IAPSO Secretariat, Convention Network  
224 Rouse Street  
Port Melbourne, Victoria 3207  
AUSTRALIA  
Tel: 61 3 9646 4122; Fax: 61 3 9646 7737  
E-Mail: mscarlett@peg.apc.org

**PORSEC '96**

**Pacific Ocean Remote Sensing Conference  
Ocean Science and Probing  
August 13-16 1996  
Victoria Conference Centre  
Victoria, B.C. Canada**

The PORSEC conference series was formed to focus attention on satellite and other remote sensing of the Pacific Ocean and coastal zones of the Pacific Rim. The first two PORSEC conferences were held in Okinawa (1992) and Melbourne (1994). The third PORSEC meeting will be held at the Victoria Conference Centre, Victoria, B.C. from August 13 to 16 1996. The meeting will consist of four days of oral and poster sessions discussing satellite, aircraft and acoustic remote sensing and ocean sciences. Some sessions will address questions of interest to PICES, the North Pacific Marine Science Organization, whose secretariat is also located at IOS, and which is one sponsor of PORSEC'96. Other sponsors include IAPSO, SCOR and COSPAR, as well as national space agencies.

General Theme

- Remote sensing in support of oceanographic and fisheries programs in the Pacific.
- Remote sensing in support of coastal management in the Pacific Rim
- Comparison of ocean measurements from acoustic and satellite sensing.

PORSEC Special Sessions

- Applications of ocean colour sensors being launched by the USA, Japan, Europe, France, China and Taiwan (POCEX, SIMBIOS).

- Significant results from water colour observations of ocean and coastal areas.
- Ocean and coastal science results from Topex/Poseidon altimetry.
- Comparison of acoustic, e.g. tomography and ATOC (Acoustic Thermometry of Ocean Climate), and satellite views of meso- and large- scale oceans structure.
- Remote sensing observations relevant to air/sea gas transfer.
- Wind and surface flux measurements by remote sensing.
- SAR observations of mesoscale and coastal, water and ice phenomena.
- User-friendly technologies for low-cost application of remote sensing.

### Abstract Submission

Deadline for submission is February 29, 1996. Language must be in English, and length must be between 100 and 200 words. Preferred submission method is a flat ASCII file (no control characters) by E-Mail to porsec96@ios.bc.ca. Alternatives are Fax to (604) 363-6479 "Attention PORSEC'96", or by mail to PORSEC'96, Institute of Ocean Sciences, P.O. Box 6000, Sidney, B.C. V8L 4B2 Canada. Program chairman is Jim Gower: gower@ios.bc.ca, phone (604) 363-6558.

### **Sixth International Symposium on Natural and Man-Made Hazards Hazards-96**

*July 21-26, 1996 Toronto, Canada*

The theme of the symposium is: **Major Natural Disasters in the 90's - What can we learn from them?**

The symposium has been organized by:

- The International Society for the Prevention and Mitigation of Natural Hazards (NHS).
- The IAPSO Commission on Natural Marine Hazards.
- Environment Canada.
- Institute of Environmental Studies, University of Toronto.
- The Tsunami Society.
- United Nations - IDNDR.

The symposium organizing committee invites papers specifically related to the scientific, social and economic aspects of this theme with particular emphasis on case studies from recent major disasters. Other papers on natural and man-made disasters will also be considered. This international symposium will be of interest to researchers, policy makers, disaster mitigation personnel and the insurance industry.

### Topics

- Geological hazards (earthquakes, volcanoes, landslides, soil erosion, etc.);
- Meteorological hazards (cyclones, droughts, desertification, etc.);
- Hydrological and Marine hazards (tsunamis, storm surges, floods, sea level rise, marine biological hazards)
- Technological and man-made hazards (air and water pollution);
- Disaster prevention, mitigation and management;
- Economic, social and political aspects;
- Public education and preparedness;
- Adaptation and risk assessment;
- Insurance;
- The IDNDR: A vehicle for action ?

### Submission of Abstracts

Abstracts of up to 500 words, with a suggested topic area, should be submitted on computer diskette no later than February 29, 1996 to: Dr. S. Venkatesh  
Chair, Scientific Committee HAZARDS-96  
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Downsview, Ontario M3H 5T4 Canada  
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### **Call for Papers 1996 Canadian Society of Agrometeorology (CSAM) Technical Session Lethbridge, Alberta, July 7-11, 1996**

The 1996 CSAM Technical session will be held on Tuesday (July 9) at the Agricultural Institute of Canada (AIC'96) annual conference in Lethbridge, Alberta.

The theme of the conference is "Water Resources and Agriculture: Protecting our future". The conference plenary session and afternoon symposium on Monday, July 8, will focus on the relationship between Canada's agricultural industry and the quality of our limited ground and surface water resources.

Papers and posters on agricultural or forest meteorology, climatology, and related topics are welcome. The title and author(s) are requested by March 1, 1996. Please send this material in electronic form if possible, on diskette or via Internet: MCLEAN@ABRSLE.AGR.CA.

For further information, contact the CSAM'96 program chairs: Sean McGinn or Hugh McLean  
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