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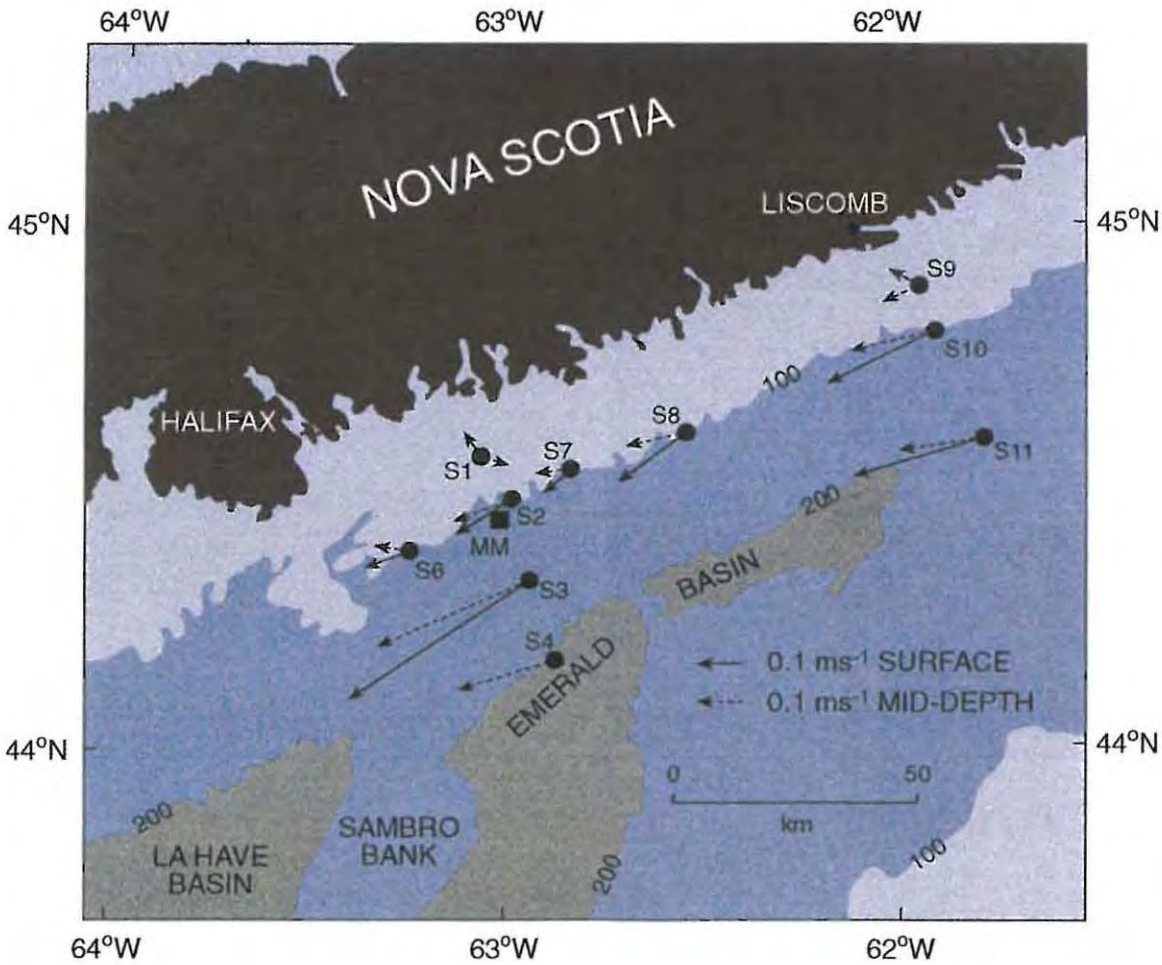

CMOS Bulletin SCMO
"at the service of its members
au service de ses membres"

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Cover page: The illustration shown on cover page represents the Mean Current Observations during the CASP Experiment on the Scotian Shelf off Halifax during December, 1985 to April, 1986. The CASP experiment has provided valuable information for the design of the CANSARP field survey, thereby improving in the long run the Search and Rescue prediction model. Read story inside at page 119.

Page couverture: L'illustration de la page couverture représente le courant océanique moyen calculé à partir des observations faites lors de l'expérience CASP sur la plate-forme Scotian au large d'Halifax entre décembre 1985 et avril 1986. Cette expérience a fourni de l'information précieuse pour la planification des relevés sur le terrain du CANSARP, ce qui, à long terme, améliorera le modèle de prédiction pour les opérations de sauvetage en mer. Lire plus de détails à l'intérieur à la page 119.

Next Issue

Next issue of the *CMOS Bulletin SCMO* will be published in December 1998. In order to close the International Year of the Ocean properly, we will be devoting this issue to the Oceans. We are now seeking contributors. Please send your articles, notes, reports or news items at the earliest to the address given above. Don't miss your chance to be part of this special issue!

Prochain numéro

Le prochain numéro du *CMOS Bulletin SCMO* paraîtra en décembre 1998. Dans le but de clore l'Année internationale des océans, ce prochain numéro sera consacré aux océans. Nous cherchons présentement des collaborateurs. Prière de faire parvenir vos articles, notes, rapports ou nouvelles au plus tôt à l'adresse indiquée ci-dessus. Ne manquez pas votre coup et soyez du nombre!

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Adresses électroniques de la SCMO

....from the President's desk

Quick - how many students* are there in Canada? Answer - over five million, taught by over 240,000 teachers. In the USA (where it is easier to get up-to-date statistics), the September 1998 enrollment of 52.7 million students was at an all time record high, expected to rise to over 54 million by 2008 - a reflection of the "baby boom echo" which occurred two years earlier in Canada than in the USA.

Over the last few years, CMOS has targeted several initiatives at students, specifically high school students, hoping to meet a number of objectives:

a) improve the understanding of meteorology and oceanography as students learn science;

b) encourage students to choose one of our two disciplines as a possible career; and

c) as a secondary effect, enhance the standing of our sciences in the eyes of the general public.

We saw the results of work by Past CMOS President Peter Zwack and his colleagues at UQAM in the power of the internet as a teaching tool in the InterMET project - as vividly presented by CMOS Tour Speaker Nathalie Gauthier last spring. We got a taste of the interest of CMOS members in education (and by teachers in CMOS) at the first Education Day organized at Congress by Steve Miller of Environment Canada's Atlantic Region. Some of the thoughts from that occasion are worth repeating now as we look ahead to the Montreal Congress next June (the first recommendation was to have an education day at the next Congress!):

a) the AMS Datastreme effort aimed at and involving thousands of American high school teachers should be extended to Canada (for more information, visit the AMS Datastreme web site at http://www.ametsoc.org/dstreme/);

b) schools like to have scientists visit and talk about their fields - we should not forget the elementary schools. Teachers like educational materials, such as cloud charts, that they can adapt to the classroom; and

c) teachers use the summer for professional development.

We need to offer one or two day "summer institute" seminars in meteorology and oceanography to teachers, as well as assist them to develop curricula for meteorology in physics and chemistry as well as in the traditional geography "home".

(Continued next page - Suite à la page suivante)

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INSIDE / EN BREF

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Already, Environment Canada's Maritime Weather Centre has decided to sponsor a summer seminar for school teachers in meteorology. Major changes to school systems taking place in several provinces today (along with shifts in power and control) offer an opportunity to introduce meteorology and oceanography at earlier periods than before.

The bottom line is that CMOS needs to attract new members, and teachers need some of the things that CMOS could offer. Is there enough interest to create a Special Interest Group (SIG) on Education (as has been done in air pollution, hydrology and other fields)? If you want to get involved, contact me or one of the people mentioned (pugsley@freenet.carleton.ca, steve.miller@ec.gc.ca, zwack.peter@uqam.ca).

As a postscript to my July column concerning news about Alternative Service Delivery Project, the full final report on consultations has now (September 14) been made available to the public on the web - and is highly recommended reading for anyone wishing to have background on the federal meteorological service. A link from the CMOS web site to the ASD site has been added under "What's New".

* The reference to "students" is meant to refer to youth in elementary and secondary schools. CMOS has tried to support the needs of students at the university and postgraduate level through scholarships and travel bursaries, to name just two examples. In addition, many CMOS Centres and Chapters actively support the annual Science Fairs at the local and regional levels which mainly benefit senior high school students.

Bill Pugsley,
President / Président
CMOS / SCMO

Erratum

Figure 2 in Agnew's paper on "Drainage of Multi-Year Ice from the Lincoln Sea" (Vol.26, No.4, p.103) was unfortunately sent incorrectly to the Editor. The figure referred to in the text should have been the Advanced Very High Resolution Radiometer (AVHRR) infrared image as shown below. We apologize to our readers.

Paul-André Bolduc, Editor
CMOS Bulletin SCMO

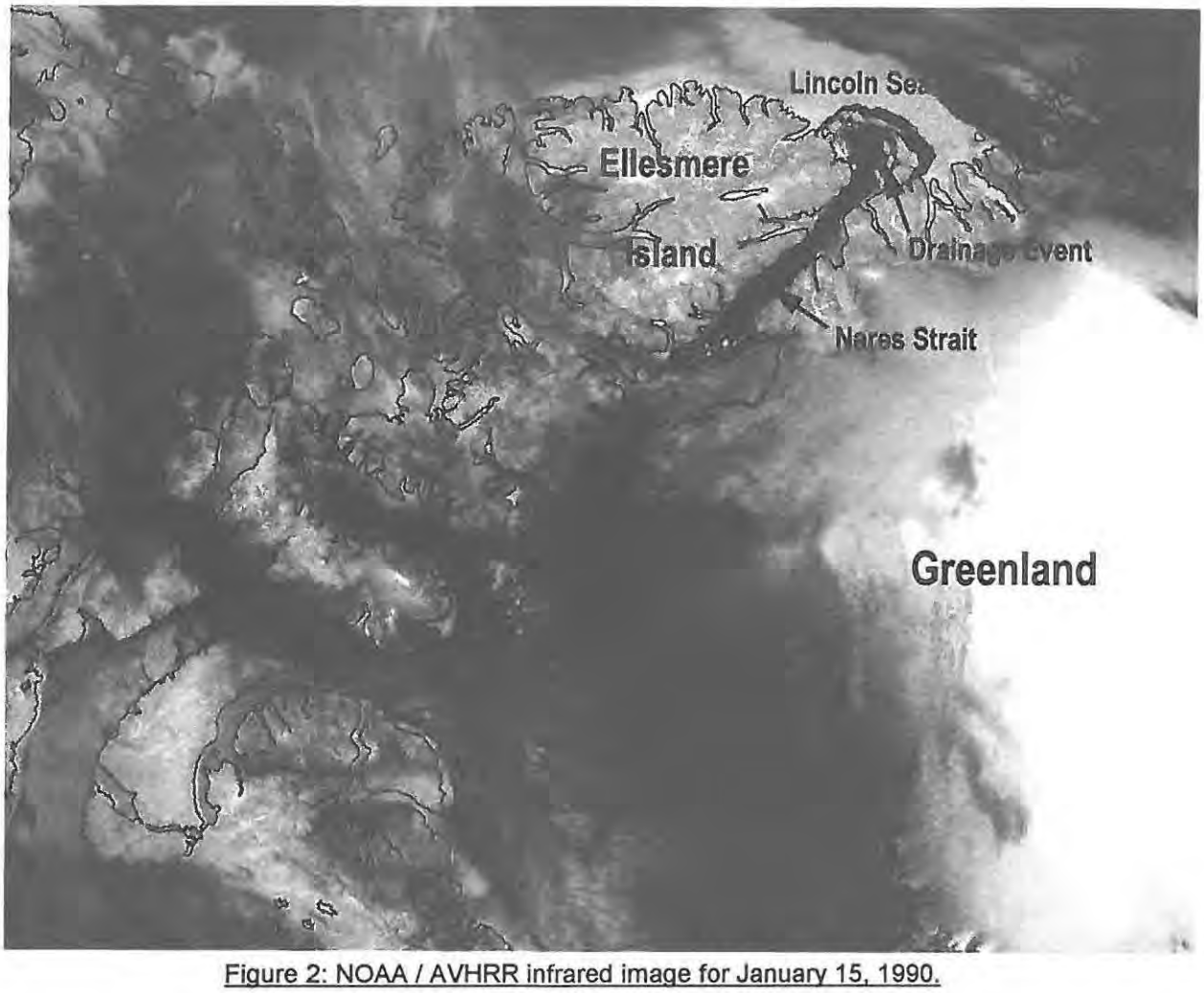

Figure 2: NOAA / AVHRR infrared image for January 15, 1990.

Improving the Skill of Search-and-Rescue Forecasts

by
Peter C. Smith[1], Donald J. Lawrence[1], Keith R. Thompson[2], Jinyu Sheng[2], Gilles Verner[3], Judy St. James[3], Natacha Bernier[3] and Len Feldman[3]

Résumé

Le système CANSARP constitue l'outil principal de planification de la Garde Cotière Canadienne (GCC) pour les opérations marines de recherche-et-sauvatage (RES). Ce système combine présentement des cartes de courant de surface basées sur des observations historiques, un modèle simple servant à calculer la contribution éolienne du courant de surface marin, et finalement un certain nombre de facteurs dérivés empiriquement (dérive de surface additionelle due en partie au vent agissant sur les surfaces exposées), afin de prévoir le déplacement d'un objet RES d'après sa dernière position connue (DPC). Ainsi alimenté par les vents fournis par le Centre Météorologique Canadien (CMC), CANSARP prévoit un certain nombre de trajectoires de dérive possibles, calculées à l'intérieur d'une marge d'incertitude donnée, et à partir desquelles est définie une zone de recherche entourant les positions les plus probables de l'objet. Par ailleurs, il est bien connu que l'accès à des données précises est d'une importance capitale durant les premières heures d'une opération RES, puisque les erreurs de prévision -- et donc la zone de recherche -- croissent rapidement avec le temps. De même, le risque de perte humaine augmente rapidement avec le temps lors de conditions environnementales extrêmes telles que durant des tempêtes d'hiver sévères ou en eaux glacées. Le succès des opérations de recherche-et-sauvetage dépend donc fortement de la qualité des prévisions à court terme de CANSARP.

Le moyen le plus direct pour améliorer la qualité des prévisions de CANSARP est de lui procurer de meilleures données environnementales pour alimenter les prévisions de dérive. À cette fin, un projet de recherche et développement a été entrepris conjointement par la GCC, le CMC, l'Université de Dalhousie, et l'Institut d'Océanographie de Bedford (IOB). Le programme, conçu dans le but de tester les améliorations apportées aux champs de courants de surface et de vents du CMC, était divisé, d'une part, en une campagne d'observations sur le Plateau Écossais entreprise durant le milieu de l'hiver, et d'autre part, en une intercomparaison des modèles de courants marins: a) entre CANSARP alimenté par des vents de résolution standard ou à haute résolution, et b) entre CANSARP et un modèle d'océan de Dalhousie.

Le présent article décrit les opérations durant la campagne d'observations ainsi que les résultats, les vents du CMC et les simulations de CANSARP, les simulations du modèle de Dalhousie, et termine avec quelques conclusions et recommendations.

1.0 Introduction

The primary planning tool used by the Canadian Coast Guard (CCG) for marine search-and-rescue (SAR) operations is known as the CANSARP system. This system presently uses a combination of background surface current maps based on historical observations, a simple model for the wind-driven component of surface current, and empirically-derived leeway factors (additional surface drift due, in part, to wind acting on exposed surfaces) to predict the motion of a SAR object from its last known position (LKP). Driven by forecast winds obtained from the Canadian Meteorological Centre (CMC), CANSARP predicts a range of possible drift trajectories (Fig.1) from which the search area is defined to encompass the most probable locations of the object. It is well known that access to accurate information is critical during the early hours of a SAR response because,

- the forecast errors and hence the search area grow rapidly with time; and
- under extreme environmental conditions (e.g. severe winter storms, frigid waters), the risk to human life also increases dramatically with the passage of time.

Therefore the success of search-and-rescue operations depends heavily on the short-term forecast skill of CANSARP.

The most direct way to improve the forecast skill of CANSARP is to provide better environmental data to drive its drift predictions. To this end, a research and development project was undertaken jointly by the CCG, the CMC, Dalhousie University, and the Bedford Institute of Oceanography (BIO). The program, designed to test improvements to both the CMC wind and surface current fields, included both a mid-winter field experiment on the Scotian Shelf and drift model intercomparisons:

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[2]Department of Oceanography, Dalhousie University, Halifax, N.S
[3]Canadian Meteorological Centre, Dorval, Québec.

a) between CANSARP driven by standard or high-resolution winds, and

b) between CANSARP and a Dalhousie ocean model.

The following sections describe the field operations and results, the CMC winds and CANSARP simulations, the Dalhousie model simulations, and conclusions and recommendations of the study.

2.0 Field Experiment

2.1 Description

The CANSARP field experiment was conducted on the Scotian Shelf off Halifax in February, 1996. Its design, based on experience from the Canadian Atlantic Storms Program (CASP; Anderson and Smith, 1989), included a small array of two current meter moorings and a MINIMET meteorological buoy (Fig.2b), weekly hydrographic measurements, and deployments of clusters of surface drifters along the mooring line. The CASP experiment revealed that the strongly sheared mean surface flow of the Nova Scotian Current lies roughly between the 100 and 170 m isobaths (Fig.2a shown on cover page), and that severe winter storms dramatically disrupt this picture as they pass over the area at a rate of twice per week. Therefore, the weekly CANSARP drifter trials were expected to show significant effects of current- and wind-driven variability.

Five different types (or configurations) of surface drifters were used in these trials (Fig.3a). The SEIMAC Accurate Surface Tracker (AST) is a barrel drifter with 80 cm draft and a small mast. Its drift characteristics (i.e. leeway) resemble those of a person-in-water and are well known from previous studies. SEIMAC's Convertible Accurate Surface Trackers (CAST) were equipped with 12 m holey sock drogues centred at 15 m, the nominal depths of the shallowest current meters. These buoys are intended to track the near-surface currents excluding the effects of leeway and the surface wind drift layer. Finally, two more realistic SAR objects were also used: a small DORY (5.2 m) ballasted with 350 lb (159 kg) and tethered to an AST for tracking, and ballasted 6-person (LIF6) and 4-person liferafts (LIF4), with and without sea anchors. Most of the ASTs had internal GPS receivers, providing hourly positions with an accuracy of ±10 m, but the CAST drifters and the ASTs placed in the life rafts and dory had only ARGOS positioning at an irregular rate of 8-12 times per day, with an accuracy of only ±150 m.

A different array of drifters was deployed in each weekly trial (Fig.3b). For Trial #1 (1-7 Feb.), five ASTs, plus a DORY with a tethered AST and the LIF6 raft with a sea anchor, were placed in a cross-pattern on the 100 m isobath near the S2 and MINIMET moorings. Trial #2 (8-14 Feb.) was similar, but without the DORY and LIF6. The Trial #3 (15-22 Feb.) deployment was split between the 100 m and 60 m isobaths, including 5 ASTs, 2 CASTs and undrogued versions of DORY and LIF4. Trial #4 (23 Feb.-1 Mar.) used 6 ASTs and 2 CASTs for deployments on the 100 m and 170 m isobaths near S2 and S3, respectively.

2.2 Results

Although storms were not as frequent or intense as those during CASP, meteorological conditions did vary substantially during the four field trials, as recorded by the meteorological measurements and forecasts. Moreover, despite a week-long failure of the MINIMET buoy, a comparison (Fig.4) of bilinearly interpolated surface winds from the CMC high- (12 km) and standard- (35 km) resolution winds (see Sec. 3 below) with uncorrected 2-m winds from the MINIMET record shows a close correspondence of the two CMC products and reasonable agreement between them and the *in situ* observations.

The CANSARP current meter data at S2 and S3 revealed a surface-intensified mean flow to the southwest whose axis lies near the 150 m isobath, in agreement with earlier observations (Fig.2a; Anderson and Smith, 1989). Furthermore, substantial vertical shears in the mean alongshore currents are in reasonable agreement with the thermal wind relationship, indicating the importance of baroclinic (variable density) effects in the region. The steric (density driven) contributions to coastal sea level variability at Halifax were found to be comparable to those driven by wind and remote forcing, but at somewhat longer time scales.

The drifter trajectories (Fig.5) show great variability of the surface drift field among the four trials. All tracks for Trial #1 lead offshore to the southwest at high rates (Fig.5a), apparently following a topographic ridge (Sambro Bank) as suggested by several models for the background mean circulation (e.g. Sheng and Thompson, 1996). Tracks for Trial#2 (Fig.5b) lead generally in the same direction, but at much lower rates, while for Trial#3 (Fig.5c) all but four drifters (2 CASTs and 2ASTs) were blown ashore by strong southerly winds on 16-18 February. Finally, tracks for Trial#4 (Fig.5d) lead offshore, but splay to the east and west at around 44°N, suggesting the importance of mesoscale (~10 km) features in the surface current field. Drifter velocities derived from the trajectories are found to be significantly correlated with Sable stress, Halifax sea level, and the cross-shore components of near-surface moored current measurements, but not with the alongshore components.

3.0 CMC Atmospheric Winds and CANSARP Simulations

3.1 CMC Forecast Model

During the CANSARP field experiment, forecasts of surface winds were produced with the RFE (Regional Finite Element) atmospheric model, which was then the operational model at CMC. Two versions of the RFE model were prepared: the North American operational model at 35-km resolution, and a 12-km version configured to operate over the CANSARP area. The operational

forecasts were available twice daily at 00 and 12 UTC, but in order to prepare the experimental forecasts at 12-km for the whole month of February, different strategies had to be examined to limit costs and to meet the needs of the Dalhousie ocean circulation model. It was decided that the most economical forecasting scheme for the month of February was a series of twenty-nine daily (24-hour) forecasts starting at 12 UTC. Furthermore, for the Dalhousie model, the best accuracy was achieved by shorter-term forecasts, so a series of 6-hour and 12-hour surface wind forecasts covering the period 1-29 February 1996 was also produced. Thus, the 24-hour forecasts were complemented with one 12-hour forecast for each day of February 1996, starting at 00 UTC. The cost of running these experiments as a single 24-hour integration took over 2 hours of cpu time on the CMC supercomputer.

The 12-km and 35-km configurations were tested against observations for one set of forecasts for November 14th, 1995 at 12 UTC. The bias and RMS errors of the wind speed and wind direction forecasts with respect to the observations at 22 stations on the Canadian east coast were highly variable but roughly comparable for the two products, suggesting that the higher resolution forecast was not significantly more accurate.

3.2 CMC CANSARP Simulations

To test the ability of the high-resolution CMC winds to improve CANSARP simulations of surface drift, 54 independent cases of drift of various objects were analyzed over selected 24-hour periods during the field trials. In total, 40 segments of AST tracks, 5 segments of CAST tracks, 4 of DORY tracks, 4 of LIF6 tracks and one segment of a LIF4 track were chosen with start times nearly coincident with those of the 24-hour CMC forecast periods (12 UTC). [Some drift periods were only approximately 24 hours because of irregular ARGOS sampling and six tracks during the first week of the experiment were of only 12-hour duration.].

TARGET TYPE	LEEWAY in (%)	MAXIMUM ANGLE (degrees)
AST	2.0 (0.8±0.1)	60
CAST	2.0 (0.0)	60
LIF4	4.3 (3.6±0.2)	35
LIF6	2.8 (2.0)	35
DORY	7.0 (3.7±0.5)	35

Table 1: Leeway and maximum drift angle for all the target types used in this experiment. Bracketed values are DAL/BIO leeway estimates based on BIO and other recent measurements and theoretical considerations.

To simulate these tracks, CANSARP was equipped with leeway factors from the National SAR manual (Table 1) and run in a predict mode, i.e. without using any information that would not have been available in real time. The predicted positions of the objects were taken to be those resulting from the application of the most likely leeway factor and angle, along with the wind-drift and surface current forcing, i.e. the equivalent of trajectory #6 in Fig.1. To assess the skill of the high-resolution winds, three displacements were calculated at 6-hour intervals over the 24 hours covered by the CMC forecast:

> control, i.e. the distance between the actual position of the object and that predicted by CANSARP driven by 35-km winds;
>
> experiment, i.e. the distance between actual and CANSARP-predicted positions using the 12-km winds; and
>
> persistence, the net displacement of the object from its initial position.

The last of these predictions, labelled "persistence", is commonly used in meteorology and, in this case, is equivalent to assuming that the object remains at its initial position. On the short time scales of interest, the persistence forecast can have considerable skill, under certain circumstances.

Sample plots of displacements vs. time from the three forecasts (Fig.6) indicate that there is very little difference between the experiment and control predictions in any of the cases considered. Thus the high resolution (12-km) wind fields provide no measurable skill to CANSARP relative to the standard (35-km) fields. Furthermore, in cases where the net displacement of the object is small, the persistence forecast outperforms both experiment and control. This result is confirmed by the overall averages of displacement for the 54 cases considered (Table 2), but may not be true for the liferafts (LIF4,LIF6) in particular.

4.0 DALHOUSIE / BIO Simulations

4.1 Circulation Model

In an attempt to improve the forecast of surface drift, a 3-D circulation model, developed at Dalhousie University (Sheng and Thompson, 1993), was modified to calculate the trajectories of surface drift objects and tested against the CANSARP field data. The model is based on the assumption that the dynamics of the flow are sufficiently linear to allow approximation by the sum of two components:

- a seasonally-varying baroclinic component diagnosed from the observed density field; and
- a barotropic component forced by wind and flows through the open boundary.

The baroclinic winter surface flow was estimated by the robust diagnostic method proposed by Sheng and

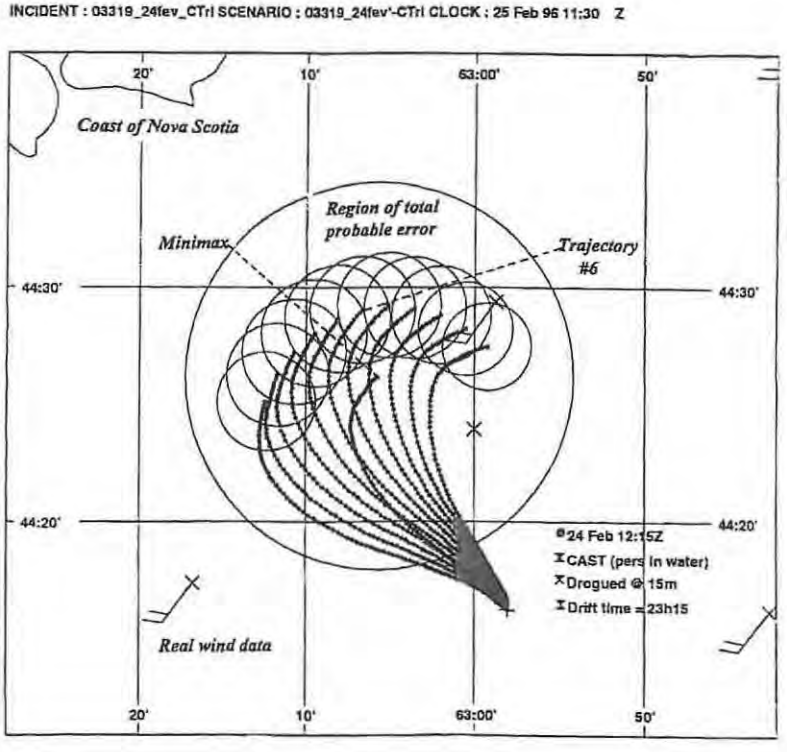

Figure 1: Sample CANSARP drift predictions for a CAST buoy. The 11 trajectories and their end point errors are calculated based on interpolated winds, currents, and estimated uncertainties in the leeway factors and angles; trajectory #6 is considered most likely. The larger circle represents the region of total probable error, which encompasses all of the trajectory end points and their errors (Verner, *et al.*, 1998).

b)

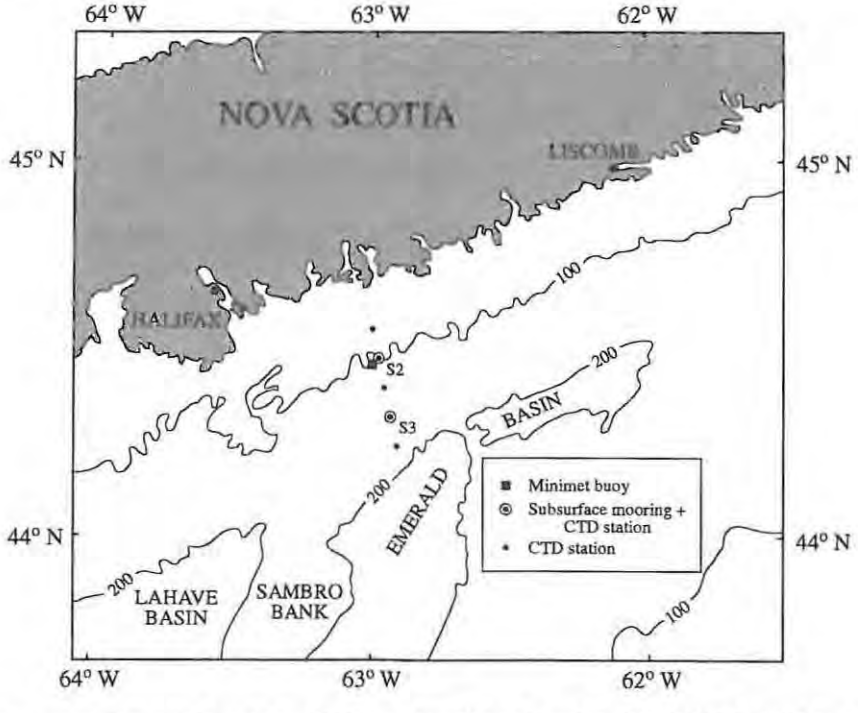

Figure 2: b) Chart showing mooring and primary CTD line locations for the CANSARP field experiment during February, 1996. (Note that Figure 2 a) is shown on the cover page.

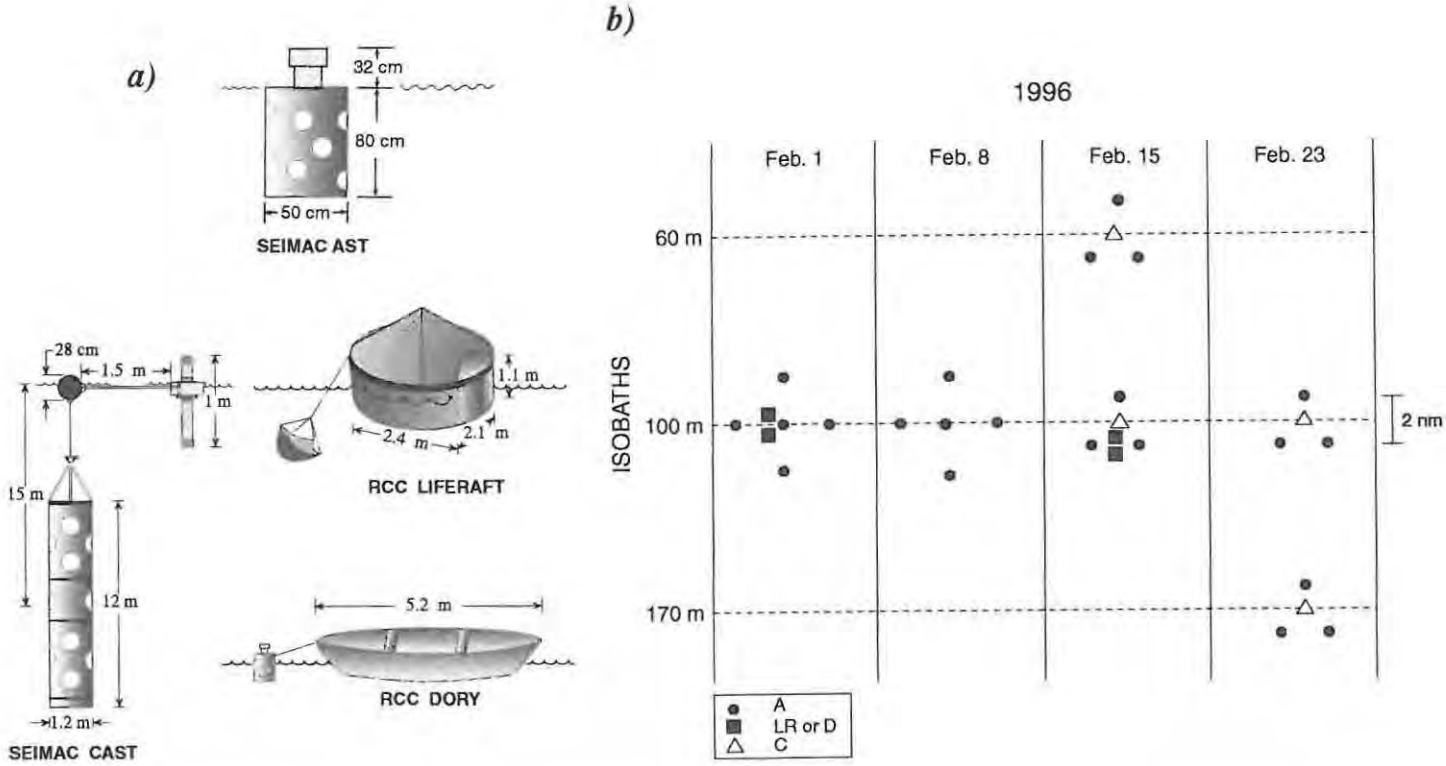

Figure 3: a) Schematic diagram of four classes of drifters used in the CANSARP field experiment. b) Drifter deployment patterns for four weekly trials on the Scotian Shelf during February, 1996. "A" stands for a SEIMAC AST; "C" for a SEIMAC CAST; "LR" for a 4- or 6-person life raft, and "D" for a 5.2m dory.

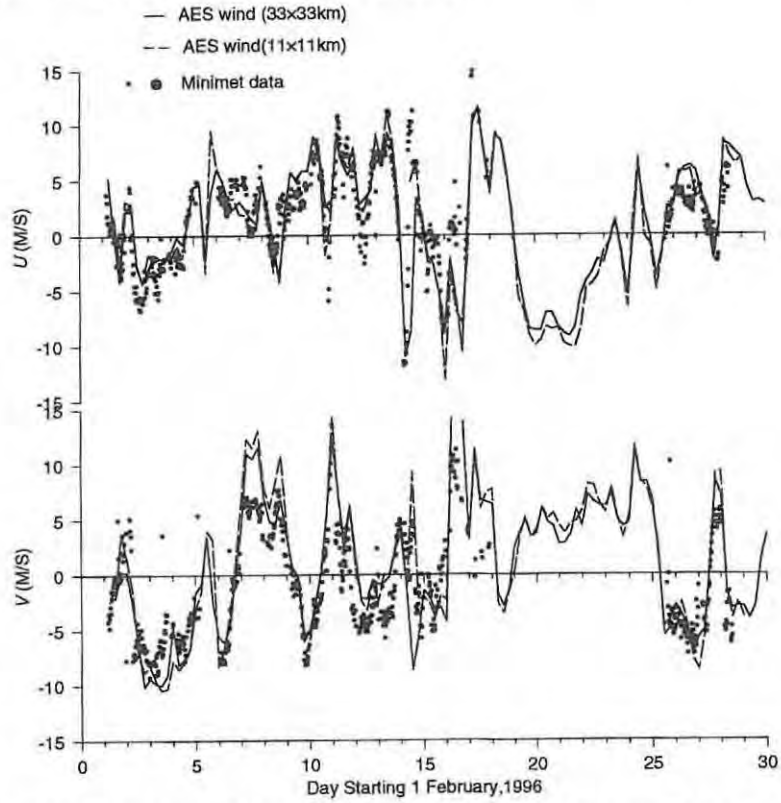

Figure 4: Validation of the CMC winds at the MINIMET mooring. The solid (dashed) line is for winds interpolated from the 35-km (12-km) fields; the dots show the MINIMET data collected at 2m during the field experiment. Eastward (northward) winds are denoted by U(V).

TARGET # and date	06			12			18			24		
	Ctrl Km	exp km	per km	ctrl km	exp km	per km	ctrl km	exp km	per km	ctrl km	exp km	per km
AST (12h)	5.58	6.02	5.14	7.88	7.97	8.49						
AST	5.01	5.37	3.86	10.55	10.98	7.84	14.52	15.38	11.77	17.00	18.27	15.14
CAST	6.30	6.14	3.23	12.58	12.25	4.85	14.68	14.43	8.35	19.72	19.62	9.71
DORY	16.91	17.47	10.91	30.83	30.18	12.22	40.10	38.85	13.34	48.07	46.75	15.77
LIF4	2.86	3.69	3.98	9.09	10.22	13.14	15.78	17.38	28.24	14.95	15.55	33.42
LIF6	2.06	2.25	5.93	4.39	3.41	12.02	7.76	8.06	18.62	10.62	11.64	20.92
TOTAL	5.82	6.15	4.62	11.46	11.61	8.37	16.13	16.67	12.46	19.30	20.17	15.49

Table 2. Average displacement, at 6-hour intervals, between observed and CANSARP predicted(ctrl,exp) or initial(per) positions for all types of SAR objects over all trials. CANSARP forecasts are derived from trajectory #6 (see Fig.1) for both the control and experiment.

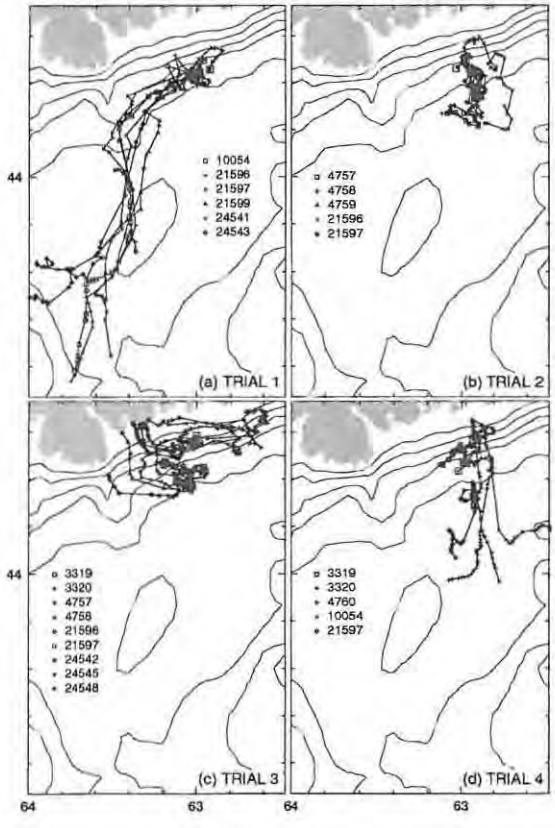

Figure 5: Positions of near surface drifters during the four field trials of the CANSARP Experiment, February, 1996. In (a) 24541 is a ballasted 6-person liferaft with a sea anchor and all others are SEIMAC ASTs; (b) all are SEIMAC ASTs; (c) 24542 is a ballasted 4-person liferaft (no anchor), 24548 is a dory with tethered AST, 3319 and 3320 are SEIMAC CASTs drogued at 15m; and all others are SEIMAC ASTs; and (d) 3319 and 3320 are drogued CASTs and the rest are ASTs.

Thompson (1996). The flow pattern exhibits many of the known features of the circulation including a generally southwestward drift of 0.1 ms^{-1} and the Nova Scotian Current, which passes down the coast along the inshore edge of Emerald Basin (see Fig.2a). The barotropic component of the model is based on the application of the Galerkin spectral method in which the vertical structure of the current is represented by the linear combination of a limited number (10) of basis functions. The equations were discretized on a rectangular grid and near-optimal friction parameters were selected based on sensitivity tests of the results against observations (Cong, *et al.*, 1998).

To isolate the impact of surface currents, wind stress forcing was derived from the standard resolution (35 km) CMC wind field by (linear) parabolic Lagrangian interpolation in (time) space. On lateral boundaries, the normal transport at the coast and sea level on the offshore boundary were set to zero. On the forward (western) cross-shelf boundary, a radiation condition was specified, while remote forcing through the backward (eastern) boundary was inferred from sea-level measurements at Halifax, after adjustments for inverse barometer, wind and variable density field (steric) effects. The linear transfer function, used to relate adjusted sea level at Halifax to the coastal value on the eastern boundary four hours earlier, represents a novel scheme for assimilating sea level data into the Scotian Shelf circulation model.

The trajectories of model drifters were estimated from the model by fourth-order Runge Kutta integration of the equation:

$$\frac{d\vec{x}(t)}{dt} = \vec{u}(\vec{x},t) + \alpha\vec{w}(\vec{x},t) \quad ,$$

subject to $\vec{x}(t_o) = \vec{x}_o$,

where $\vec{x}(t)$ is the drifter position at time t, $\vec{x}_o$ is the initial position at t_o, $\vec{u}(\vec{x},t)$ is the model velocity, $\vec{w}(\vec{x},t)$ the wind (assumed to be at 10 m) and α is the leeway factor. The leeway factors applied to the Dalhousie model integrations (Table 2) were based on recent field measurements and model studies and hence differed from those selected from the National SAR manual for use in the CANSARP simulations. For example, the AST leeway was derived from separate estimates of the surface layer wind-drift factor, $0.3\%|\vec{w}|$ (Csanady, 1984), and the relative velocity caused by the wind acting on exposed surfaces, $0.5\pm0.1\%|\vec{w}|$ (Smith,1992). Liferaft and dory estimates come from empirical measurements (Oceans, 1994) and the CAST drifter was assumed to follow the current at 15 m with zero leeway (i.e. $\alpha=0$). Further details about the model formulation and implementation are described by Cong, *et al.* (1998) .

4.2 Comparison of Model and Observation

The basic measure used to assess the skill of the Dalhousie model with respect to bottom pressure and current is the ratio of the variance of model errors, Var(O-P), to that of the observed quantity,

$$\gamma^2 = \frac{Var(O-P)}{Var(O)}$$

In general, the smaller γ^2, the higher the model skill. If $\gamma^2<1$ the model has skill, if $\gamma^2>1$ the sample mean (for example) is a better predictor. For drift, we use a similar statistic with median displacement playing the role of variance as a measure of spread between forecasts and observations.

4.2.1 Bottom Pressure and Currents

Cong *et al.* (1998) have examined the Dalhousie model skill in predicting bottom pressure and currents at the CANSARP moorings. Because the model was effectively forced by sea level at nearby Halifax, the model skill in predicting bottom pressure at S3 was high ($\gamma^2=0.15$). Moreover, the prediction of sea level difference between the coast and S3, a measure of the longshore geostrophic bottom current, was also reasonably accurate ($\gamma^2=0.46$). However, the mean shear between the near-surface alongshore flows and the near-surface variance in the cross-shore components of the flow at S2 and S3 were not well-represented by the model. These discrepancies are thought to arise from inadequate representations of the baroclinic flow and its variability.

Direct estimates of the ratio of model error to observed variance for the alongshore current component indicate that $\gamma^2>1$ for the surface and mid-depth currents at S2. This appears to be related to an overprediction of S2. currents. However, increased skill may be achieved by averaging the currents at 16 and 50 m on S2 and S3, for which the variance ratios are 0.65 and 0.48, respectively. Thus it appears that model performance improves at scales larger than 15 km, which is roughly equivalent to the model resolution. At the deeper instruments, γ^2 lies in the range between 0.63 and 0.83 (Cong, *et al.*, 1998).

4.2.2 Drifter Trajectories

Representative model trajectories compare reasonably well with the observed trajectories (Fig.7). The model captures the strong southwestward displacement in Trial #1 as well as the onshore displacement in Trial #3. The offshore motions in Trials #2 and #4 appear to be under-estimated however.

A statistical measure of drifter displacements relative to their initial positions is presented in the left-hand panels of Fig.8. The solid curve in each panel represents the time-varying radius of a circle centred on the release points, that encompasses 50% of the drifters. Similarly, the lower and upper dashed curves represent radii that encompass 25% and 75% of the drifters, respectively. (These bounding lines are not plotted if the number of active drifters drops below 5.) The top left panel, for example, shows that after 100 hours, only half the drifters in Trial #1 are within 100 km of their initial positions; the bottom left panel indicates that in Trial #4, half the drifters moved less than 20 km in 100 hours. Hence the persistence forecast in Trial #4 is expected to be better than for Trial #1.

The right-hand panels in Fig.8 show similar statistics for the observed displacements with respect to the model-predicted positions, i.e. for the model errors. Here the top right panel shows that after 100 hours, half the drifters in Trial #1 are within roughly 40 km of their predicted positions. For Trials #2, #3 and #4, the radii containing half the drifters are closer to 20 km after 100 hours.

4.2.3 Model Skill versus CANSARP and Persistence

In order to compare the Dalhousie simulations with persistence and CANSARP, the statistical measures of observed displacements, CANSARP and Dalhousie model errors were plotted over the first 30 hours of drift (Fig.9). In this figure, CANSARP error statistics are plotted over both the observed (left) and Dalhousie error (right) displacements at 6, 12, 18, and 24 hours, as crosses representing the median, first and third quartiles of the drifter containment radii. On this more relevant search-and-rescue timescale, the Dalhousie model clearly outperforms CANSARP in all trials and persistence (comparing left and right panels) for Trial #3 only. After 24 hours, the Trial #1 50% radii for CANSARP and the Dalhousie model differ by roughly a factor of 3, which is equivalent to a factor of 9 in the search areas. The persistence forecast also shows more skill than CANSARP for all but Trial #3. This conclusion supports that reached in the previous section that persistence generally outperforms CANSARP at timescales up to 30 hours.

Figure 6a) AST 10054, February 27th

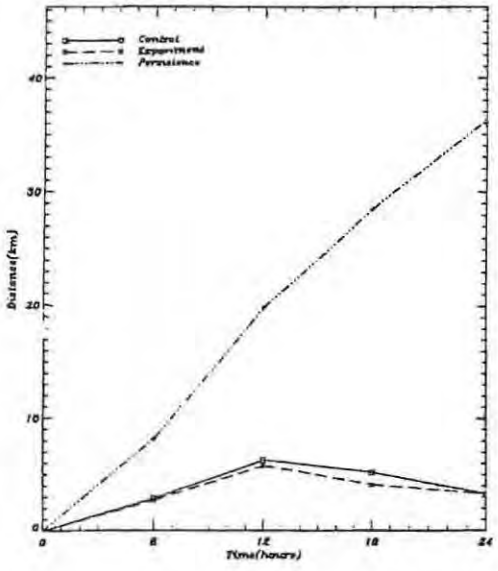

Figure 6b) LIF6 24541, February 05th

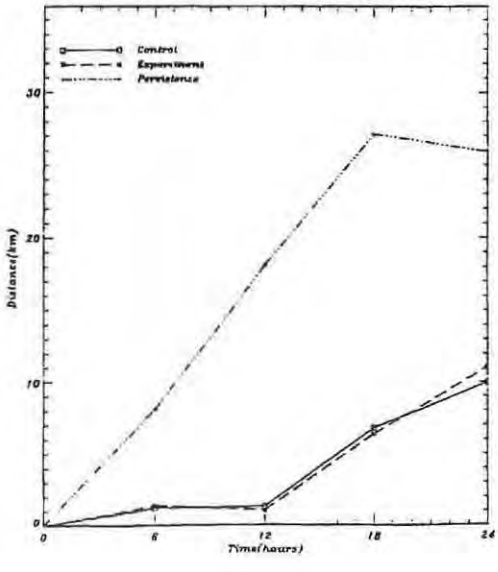

Figure 6c) AST 04760, February 24th

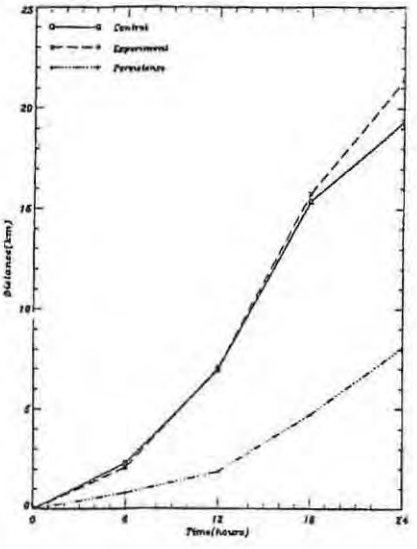

Figure 6d) CAST 03320, February 28th

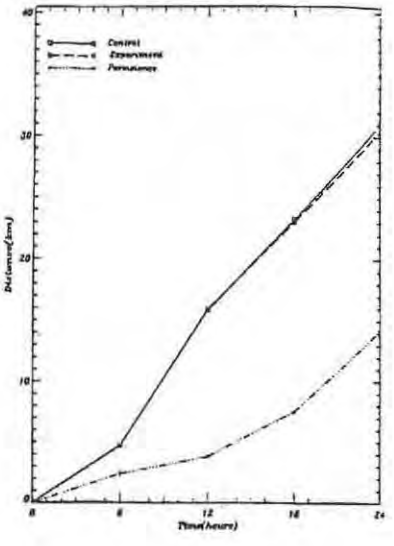

Figure 6e) DORY 24548, February 01st

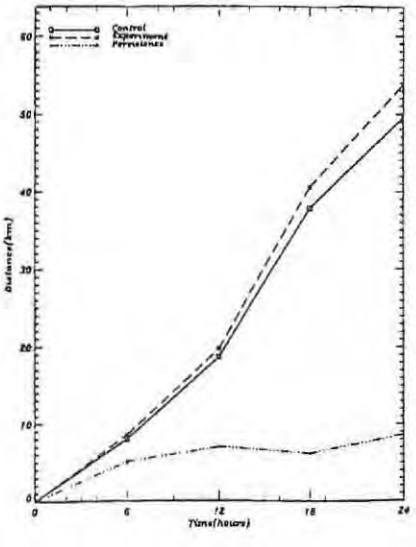

Figure 6: a) Evolution of 24 hours drift of AST buoy #10054 on 27 February, 1996. The observed displacement of the object (persistence) and CANSARP predictions (control and experiment) are compared. b) Drift evolution for LIF6 #24541 on 5 February, 1996. c) Drift evolution for AST #4760 on 24 February, 1996. d) Drift evolution for CAST #3320 on 28 February, 1996. e) Drift evolution for DORY #24548 on 1 February, 1996.

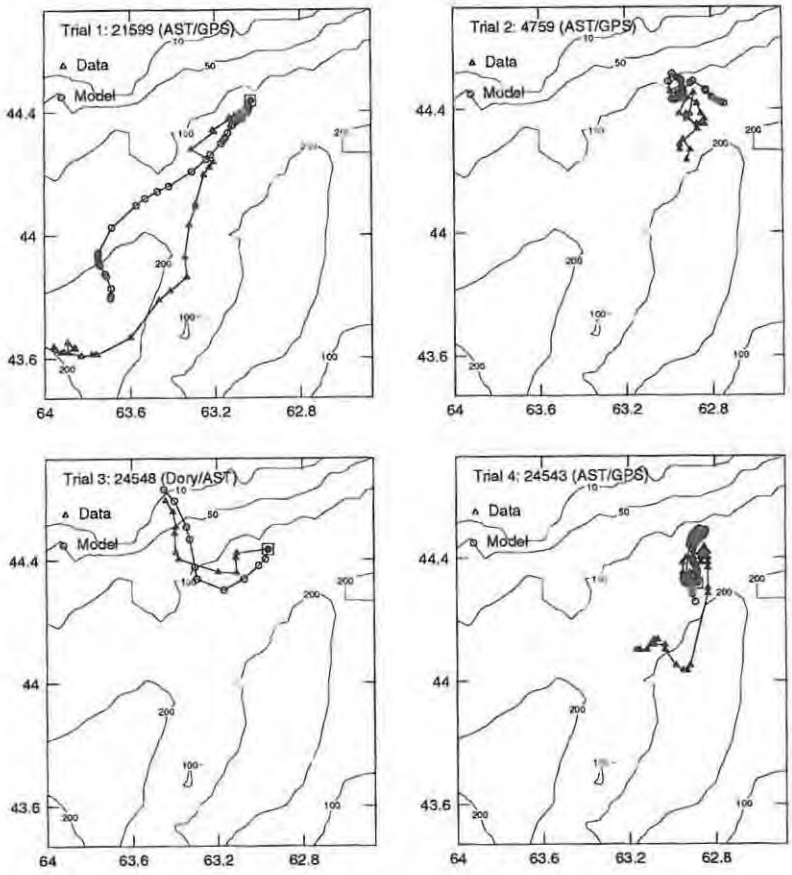

Figure 7: Typical observed and predicted drift trajectories during the CANSARP field experiment. The observations (predictions) are indicated by triangles(circles). The low-resolution (35-km) CMC winds were used and the baroclinic background current is included in the model.

6. Conclusions and Recommendations

The primary conclusions of this study are:

1) The use of high resolution (12-km) CMC winds provides no apparent benefit over low resolution (35-km) in estimating surface drift with either CANSARP or the Dalhousie model.

2) At critical search-and-rescue timescales of t<30 hours, the Dalhousie model forecasts have significantly more skill than CANSARP and also outperform persistence by a lesser amount.

3) At longer timescales (t<140 hours), the Dalhousie model forecast is again better than persistence, especially in Trial #1 where the radius (area) containing half the drifters exceeds the model error radius (area) by a factor of 3 (9). Based on these results and the implied increases in search-and-rescue efficiency, we recommend that steps be taken to incorporate Dalhousie model forecasts (or equivalents) into the CANSARP planning system.

Both CANSARP and the Dalhousie prediction systems are based on dynamics in the form of models of the ocean's surface circulation. The main differences are found in the complexity of the dynamics and the amount of data needed to drive the model. In general, the more sophisticated and accurate a model, the more realistic its dynamics and the more data are required to drive it. These are the main reasons for the Dalhousie model's better performance than CANSARP. Yet the Dalhousie model is still relatively simple; its dynamics are linear and its density field is fixed in time. For this reason, we feel that we are presently far from the limit of predictability in the coastal ocean. Several modifications could further enhance the Dalhousie model forecast skill, including:

- the ability to assimilate into the model information from nearby surface drifters, in order to improve the local estimates of surface currents,
- the ability to infer small-scale baroclinic variability from satellite imagery, and
- the ability to estimate backward boundary conditions through the use of a barotropic model running on a much larger domain.

Another major difference between the CANSARP and Dalhousie drift simulations is the use of improved leeway estimates in the Dalhousie model. Further testing could determine how much of the difference is attributable to leeway errors versus improved surface current dynamics. Nevertheless the range of leeway estimates for similar objects (Table 1) points to the need for further quantitative analysis of this phenomenon.

The disappointing impact of the higher resolution CMC winds could be attributed, in part, to the much larger importance of the currents in this region of the Scotian Shelf, but this result may not hold everywhere in the coastal and offshore waters. At the time of this writing (Spring 1998), a completely new AES forecast model is being implemented at CMC (a global variable resolution finite element model, the Global Environmental Multiscale model, GEM, Côté et al, 1998a,b). Tests are under way to bring the horizontal resolution of the operational GEM model to 24 km during the Summer of 1998. Experimental versions of this model will soon run routinely at resolutions near 10 km. Small but positive improvements to CMC forecast winds are expected from these new versions of the forecast model.

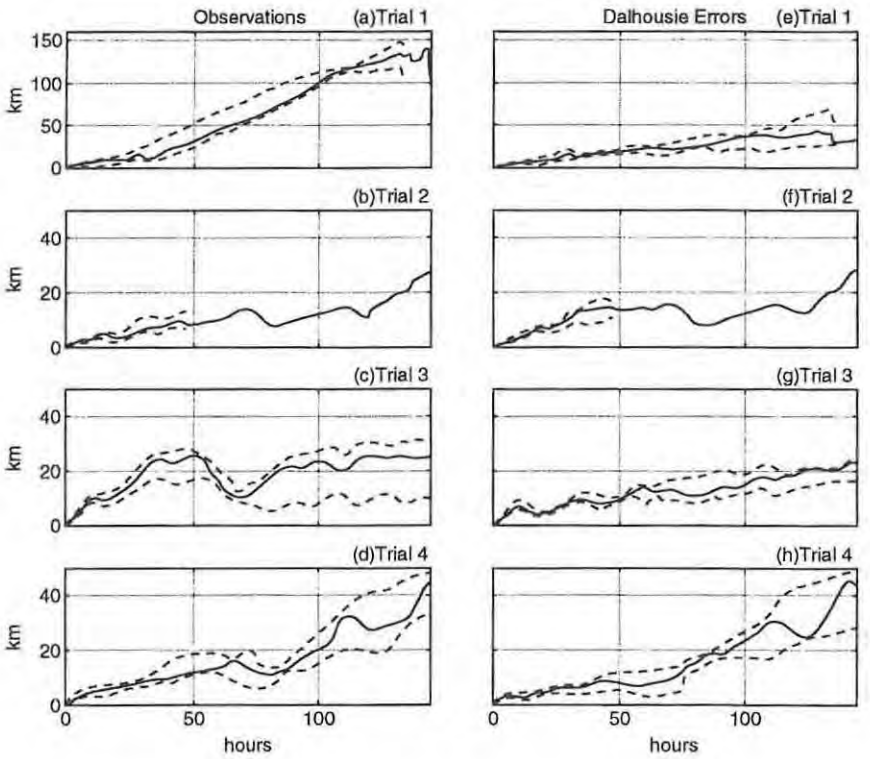

Figure 8: Drifter displacements with respect to their initial positions (a-d: left panels) and predicted positions (e-h: right panels). The solid line shows the time-varying radius of a circle which encompasses 50% of the drifters; the lower and upper dashed lines represent the 25% and 75% quartiles, respectively.

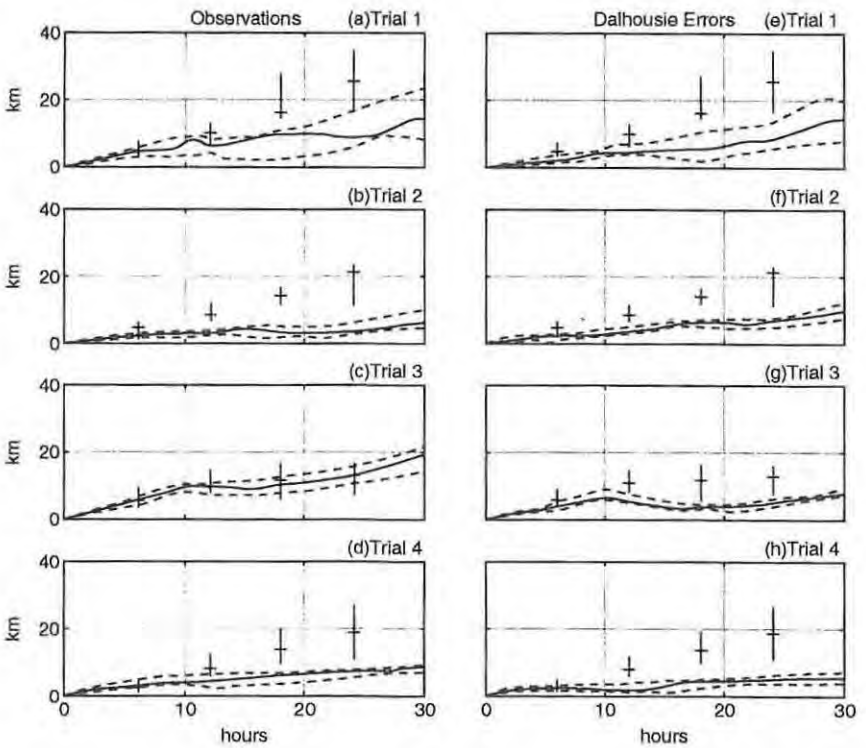

Figure 9: As in Fig.8, but for the first 30 hours of drift only. The crosses represent the median, first and third quartiles of the CANSARP error radii at intervals of 6, 12, 18 and 24 hours after release.

A final but important result from this project is the extremely valuable dataset which has been generated. It contains wind and current data, both observed and simulated by sophisticated models as well as a large amount of drifter trajectories which have been observed during the field experiment. It is recommended that these data be safeguarded and used in future experiments or projects.

Acknowledgements

The authors are grateful to Mr. A. Patterson of the Canadian Coast Guard for his initial encouragement and guidance and for providing leeway factors and operational support to the project. This project (EC-2/95) was supported by the National Search and Rescue Secretariat (NSS) New Initiative Fund (NIF).

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Calendrier 1999 de la Royal Meteorological Society

Le calendrier 1999 de la Royal Meteorological Society est maintenant disponible. C'est un magnifique calendrier avec des photographies artistiques illustrant la météorologie.

Le coût est de 5,30 £ pour chaque calendrier ou 21,80 £ pour cinq. Ce coût inclus les frais de poste et d'emballage. On peut se le procurer en écrivant à la Royal Meteorological Society, 104 Oxford Road, Reading, Berkshire, England, RG1 7LL.

Royal Meteorological Society Calendar for 1999

The 1999 Royal Meteorological Society Calendar is now ready for distribution. It is beautifully produced with photographs of high meteorological and artistic merit.

The cost is (British sterling) £5.30 each or £21.80 for five, including postage and packing, and can be ordered from the: Royal Meteorological Society, 104 Oxford Road, Reading, Berkshire, England, RG1 7LL.

Letters to the Editor

Do some Secrets of Soaring still lie in the Dark?

Among the responses to my recent article "Do some Secrets of Soaring still lie in the Dark" (*CMOS Bulletin SCMO*, Vol. 26, No. 3, p.72). I also had two separate contacts with the hang-glider community according to which the more experienced pilots among them wait for a shadow to come along before they "shove off". Apparently neither of these sources had givin much thought thus far as to the actual connection between the shadows and the thermals might be except that the technique simply worked for them.

Needless to say, I found these observations most interesting. It may well be that hang-glider pilots taking off like birds and being exposed with their bodies directly to the air currents, develop a more "instinctive" relationship with the elements which suport them, than do the pilots flying much larger, fully enclosed gliderplanes. The penalties of error (read "negative reinforcements") are also more immediate and dangerous for them.

Tillmann Steckner.
London, Ontario.

ENSO is anomalous but not El Niño!

As a marine meteorologist who has operated at sea off the west coast of South America and the Galapagos Islands during three El Niño seasons, I take issue with the insert "The El Niño Phenomenon" published last February in the *CMOS Bulletin SCMO* (Vol.26, No.1, page 5).

El Niño is a seasonal event wherein a warm current flows down the northwest coast of South America annually.

It is generated during the Southern Hemisphere winter by the SE Trade wind which, on crossing the Equator, veers to become the SW Monsoon. This creates a head of water along the coast of Costa Rica and inundates the Gulf of Panama. When the SE Trade relaxes and is replaced by the NE Trade, this head of water is released and passes down the coast of Colombia, Ecuador and may reach the northern coast of Peru. Arriving in late December, it is called El Niño locally.

Additionally, the Trade winds blowing westwards across the Pacific cause a more massive head of water in the ocean areas around Southeast Asia. This also flows back seasonally depending on the characteristics and distribution of the Trade winds in tropical waters. Occasionally, this eastward flow may reach the Galapagos Islands and reinforces the coastal El Niño. This is the anomalous ENSO event and should be referred to as such in scientific publications.

To refer to ENSO as El Niño is simply pandering to the trend of journalism to personify and sensationalise newsworthy natural events. Dave Phillips, being the knowledgeable climatologist that he is, puts this subject in its right perspective in his arcicle on page 24 of the same issue of the *CMOS Bulletin SCMO*. Unfortunately, even he did not entitle his excellent summary "Blame it on ENSO".

M.R. Morgan
Dartmouth, N.S.

About our Members!

I am giving below details of the Hazards'98 Conference held in Greece, May 1998 where I presented an invited paper. I would like to see a section in the *CMOS Bulletin SCMO* called "ABOUT OUR MEMBERS" similar to the one in AMS Bulletins in which the following information on my conference attendance could be included together with similar activities of other CMOS members.

Madhav Khandekar was invited at the seventh International Symposium on Natural and Man-Made Hazards held in Chania, GREECE, May 17-22, 1998, to present a keynote paper entitled "The 1997 Super El Niño, Indonesian Fires and the Malaysian Smoke Problem: A Deadly Combination of Natural and Man-made Hazard". Dr. Khandekar, a senior consulting meteorologist with Baird & Associates,Ottawa, has done extensive research on ENSO(El Niño/Southern Oscillation) and its impact on global weather with particular reference to the Indian and South Asian Monsoon. In his paper, Khandekar presented a brief overview of the 1997 El Niño and the unprecedented drought conditions produced over the Island of Borneo (in Indonesia) which resulted in extreme and hazardous air pollution episodes over the province of Sarawak in Malaysia. At present, Khandekar and his co-worker Dr. T.S. Murty (at Baird & Associates) are developing an air quality model for selected cities in the Sarawak province in Malaysia.

Madhav Khandekar
Unionville, Ontario.

Answer from the Editor:

I appreciate the suggestion from Madhav Khandekar but I would like to point out that every time I receive some material regarding the life of CMOS members I make a point to notify the Society through the *CMOS Bulletin SCMO*. To make this a formal section would be premature at this point in time.

Paul-André Bolduc
Ottawa, Ontario.

About the future of A-O !!!

Correction notice: The paragraph titled Citations, in the article by Asselin and Campbell: "The Future of A-O", page 111 of the August *CMOS Bulletin SCMO*, gave a very unfavourable perception of citations to A-O. The paragraph should have read as follows:

> Citations - ISI ranked A-O on its annual number of citations to the lifetime cumulative sum of articles printed, at the 39th percentile (39%) with up to 436 citations per year, placing it 2/3 of the way down the list of the 4600 journals reviewed by ISI. This ranking is surprisingly good since it is based on only 540 A-O articles from 1973 to 1996, representing an average of 4 citations per year for every five papers ever published. Obviously, older articles continue to be cited!

J'espère que ceci est plus clair.

Richard Asselin,
Ottawa, Ontario.

I have read with interest the article by Asselin and Campbell concerning A-O. There are some interesting statistics on impact and all that, which I find quite encouraging. Of course, the discouraging part is the small number of articles submitted to the journal! This is not a new problem and, as a former editor (1984-87), I can testify that it was subject to fluctuations at that time. However, it would seem that by many measures the quality of the journal has been maintained as competitive. I do not have a good idea why the number of submissions is down. AES research has certainly dropped by a substantial amount over the past 5 years (40%) and I shudder to think what has happened to DFO physical oceanography. On the other hand, the Climate Research Network has provided for considerably more research within the university community, where are those results going? I guess the bottom line is that the A-O editor (with help from associate editors) always had to be aggressive in seeking articles and yet maintaining the quality. Also getting support from senior management within the relevant government research agencies. The issue to me as an editor was: do you want to do it? Is the publication of a scholarly journal a worthwhile objective for CMOS? Do you believe in it? If the editor and associate editors and the executive of CMOS continue to believe that, then they will do what is necessary to make it succeed both as a viable enterprise and a quality enterprise.

So one of my answers to why A-O?, is that CMOS is a scientific society and that is what scientific societies do; they publish results from scholarly research having gone through the process of peer review. As editor, I felt that all Canadian researchers should consider A-O for publication but that not all A-O publications should be Canadian nor should all Canadian publications be in A-O. My feeling is that as the organ of the Canadian community, the journal should have a Canadian character. That means to me, dominated by subjects of particular relevance to Canadians, e.g. snow, the arctic, ice, mountain waves, numerical weather prediction (because Canada needs it and has been successful at it). Anyway, you get my drift. A subject which is totally universal can still have an explicit Canadian connection if it is developed by a Canadian.

Also, when I was editor, I felt some obligation to provide more service than was usual for a main journal in terms of timeliness and helpfulness. I felt it was particularly important to help some inexperienced Canadian scientists learn the ropes in terms of publication. Again, I think the role of a scientific society like CMOS is to serve the scholarly needs of its members and there are not too many university courses on how to write a paper. So I think there are a number of very good reasons to keep on trucking with A-O, and with CMOS for that matter.

Phil Merilees
7 Grace Hopper Ave
Monterey, CA, 93942-5502

Dear Richard,

I read with interest your article about the future of Atmosphere-Ocean. I urge CMOS to continue to support this journal. The citation index statistics are illuminating. However, the Citations (ISI rank of lifetime cumulative number) disturb me since of the 436 citations to A-O for 1973-1996 papers, 68 of them are to my Atmosphere Ocean piece (Evidence for decadal ... 29, 197-231). Is it true that this paper has accounted for 16% of all A-O citations??? I hope not. I suspect if you include other papers from the R.W. Stewart Symposium, then this percentage would be much larger than 16%.

What this is clearly saying is that CMOS should aim towards more special issues based on symposiums. This would bring the international stature of A-O up a notch. Alternatively, one should try and twist the arm of some of our members with international stature to be editor of the journal to boost its international exposure. Page charges are not, in my opinion, an issue, since that AMS and AGU journals all have much higher page charges. Anyway, I hope that CMOS continues to encourage people to support the journal.

Andrew Weaver,
Victoria, B.C.

Dear Andrew,

What the *CMOS Bulletin SCMO* article failed to say clearly is that A-O is now getting of the order of 436 citations PER YEAR (sic) to articles previously published. This represents four citations per year (not in a lifetime!) for every five articles ever published (since 1976).

If you got 68 citations to just one article, that means this article was extremely useful for many people. This also implies that the total number of citations to A-O is far from evenly distributed across the total number of articles published! However, please note that the citations to your article probably did not all occur in the same year; in fact, you probably have more than 68 citations by now! So, your article was probably not responsible for 16% of all citations in any one year, but they certainly helped raise the total. Keep up the good work, and submit it to A-O!

Unless I made a very comprehensive research (using the Science Citation Index database) on each of the authors who have published in A-O, or on the individual articles, I cannot answer the question concerning the number of citations to special issues or other issues for that matter.

Thank you for your comment. There will be a discussion at the next Council meeting, on the future of A-O.

Richard Asselin,
Ottawa, Ontario.

Dear André

It is hoped that "The Road to Siwa" which appeared in the August 1998 issue of the *CMOS Bulletin SCMO* (Vol. 26, No.4, p.99) will be followed by more articles containing memories from members about interesting and memorable occurrences in their working past.

Uri Schwarz,
The WeatherMan
Ottawa, Ontario.

Dear Uri and all CMOS members,

Please send them in, including, if available, a photo that could illustrate the story. I will be pleased to publish them.

Paul-André Bolduc
Ottawa, Ontario.

ATMOSPHERE-OCEAN - Back on Track!

Interesting and useful comments were received (two of which are printed above) on the question of the future of A-O, following the Halifax discussion and the article in the August issue of the *CMOS Bulletin SCMO* (Vol. 26, No. 4, p. 111). With these points of view in mind, the CMOS Executive and the CMOS Council held discussions on the question. As a result, the on-line version has been approved, and is accessible for free via the CMOS Homepage (please do not cancel your subscription yet, it is still experimental!).

Council was also asked to ponder the two main views expressed by members, namely whether A-O should transform itself into a major international journal, focusing on an appropriate niche topic, or maintain the current broad range of topics. The current mission of A-O, which is to publish refereed papers of original research in any aspect of meteorology and oceanography, was retained, but it was recommended that we enhance our efforts to publish special issues that can have international appeal, using distinguished guest editors.

As a small journal, A-O has a remarkable record of citations and impact on the scientific community, with about 400 citations per year to current and past articles (see correction notice to August Bulletin article on previous page). Thus, despite the small number of articles, and the small number of subscribers, it is evident that papers printed in A-O do reach the attention of the scientific community. Members should be proud of this achievement and continue to support their journal by submitting some of their best papers to A-O without the fear that they will go unnoticed.

And, as icing on the cake, it now appears that submissions are back to normal, and that A-O will be OK again next year!

I thank sincerely all those who took time to contact me with their various comments on this important issue. They were very useful in our discussions.

Richard Asselin,
Director of Publications.

Do not hesitate to write to your *CMOS Bulletin SCMO* Editor. Share your ideas, express your opinions, let us know your concerns. Other people might be interested to read what YOU think!

N'hésitez surtout pas à écrire à votre rédacteur du *CMOS Bulletin SCMO*. Partagez vos idées, donnez votre opinion, exprimez vos craintes. D'autres sont intéressés à lire ce que VOUS pensez!

In Memoriam

Theodore (Ted) L. Wiacek (1915-1998)

Veteran meteorologist and weather forecaster, Ted Wiacek died at Brantford, Ontario, June 23, 1998. Ted was a graduate of 1937-38 University of Toronto's MA in physics (meteorology) program and, following the course, was employed by the Meteorological Service and posted to St. Hubert airport, then Montréal's civil airport, to provide aviation forecasts for the new Trans-Canada Air Lines (now Air Canada). Within a year, when World War II began, Ted was one of four forecasters sent to Halifax to establish a new forecast office and begin operational services for the Royal Canadian Air Force and the Royal Navy. Three years later, when the RCAF required a forecast office for a group headquarters in St. John's, Newfoundland, Ted was sent there to organize and head an office. He remained in Newfoundland until the end of the war and then was a forecaster at the Halifax office for a year until he was posted to the office at Toronto Malton (now Pearson) airport late in 1946. When he retired in 1977, he was Chief meteorologist and officer-in-charge at that office. Ted leaves several sisters, brothers, nieces and nephews.

Morley Thomas
CMOS Archivist

Svenn Orvig (1920-1998)

Svenn Orvig was born in Bergen, Norway, on August 4, 1920. He died in Kingston, Ontario of a stroke on May 28, 1998, aged 77.

Like many Norwegians, the Orvig family have been traditionally connected with the sea. After leaving school Svenn joined the Norwegian merchant navy and travelled the seas of the world. After Gemany occupied Norway in 1940, he found his way to Canada and visited "Little Norway" (in Toronto) where he enrolled in the Royal Norwegian Air Force-in-exile. He spent a large part of the remainder of World War II as a pilot, crisscrossing the Atlantic Ocean attached to R.A.F. Coastal and Ferry Commands.

At the end of the war Svenn returned to the University of Bergen and completed his undergraduate degree in geophysics in 1948. Shortly afterwards, he came back to Toronto and joined the Canadian Meteorological Service. He soon moved to McGill University for graduate work, completing his M.Sc.(1951) and PhD.(1954). At the time he came to Montréal, a group of faculty at McGill was initiating research programs in Arctic Canada in conjunction with the Canadian branch of the Arctic Institute of North America (AINA), at that time on the campus. Orvig joined one of the teams and in 1950 went to Baffin Island to develop glacio-climatological studies on the Barnes Ice Cap. He returned to Baffin in 1953 to "live" for the summer on the summit of the Penny (Highland) Ice Cap. During this period he was appointed as Assistant Director in AINA, and became Director of the Montréal office from 1954 to 1956.

In the 1950s an Arctic Meteorology Research Group was created in the university. It was funded through contract research, but as the unit expanded, it came to include university teaching appointments. In 1957 Orvig was made an Associate Professor in the Department of Geography and he moved to the Department of Meteorology when it was created in 1959. Subsequently, he became departmental chairman (1970-76).

However, before this happened, his skills as an administrator, as well as a teacher and a scientist were recognized, and he was appointed Executive Assistant to the Dean of the Faculty of Arts and Science in 1964. He quickly earned an enviable reputation as a sympathetic mediator duing the period of student unrest in the second half of the sixties.

Shortly after the faculty was subdivided into its two major components, he became Dean of the Faculty of Science, a post he filled with great success in a faculty with a few large (and powerful) as well as small, departments. He was twice elected to Senate, and to the Board of Governors of the university.

Svenn never allowed these various activities to encroach on his deeply-held interest in scientific research. In the first decade after leaving graduate school he concentrated on mass balance, glacio-climatological studies of ice caps around the Arctic Ocean. This was to lead him (following the work of earlier Scandinavians) to recognition of the amplified role of climatic change in the polar regions. This was to become the central point of Orvig's research. It was greatly strenghted by the presence of Eberhart Vowinckel in the McGill meteorology department. He had worked on the meteorology of the Norwegian Sea for the German Admiralty during the war, and the two, at one time "adversary" meteorologists, Svenn and Eberhart, combined their skills for the next 20 years in producing comprehensive computer models to present a view of the radiation budget over the polar ocean, the adjacent seas and arctic landmasses.

Orvig's achievements were recognized by many honours and awards. He was elected to the Royal Society of Canada in 1980 and was a member of its Council for three years. He received the President's Prize of the Canadian Branch of the Royal Meteorological Society, the Andrew Thomson Prize In Applied Meteorolgy (with E. Vowinckel) and the Patterson Medal of the Atmospheric Environment Service of Canada. In addition, he was elected Fellow of the American Meteorological Society. During his career he published more than sixty papers, a number of them jointly with other authors.

He retired in 1986, and with his wife Elizabeth Anne (Winkie) moved to Kingston, Ontario, having been named Professor Emeritus of Meteorology and Dean Emeritus of the Faculty of Science at McGill University. Unhappily, within a few years his health deteriorated. He fought with great gallantry a series of strokes, the first of which occurred during a return visit to Montréal, and which were eventually to lead to his death. He is survived by his wife and two sons.

Svenn will be remembered by the scientific communitv for his contributions to the atmospheric sciences; the people of McGill who knew him for nearly forty years will also remember him for his unfailing good humour and for his continuing hard work on behalf of the university community.

J. Brian Bird,
McGill University.

About our Members

If you have recently retired, changed employment, been honoured in some way, or have any news or information you would like passed on to CMOS Members via the Bulletin, please let us know.

Paul-André Bolduc, Editor
CMOS Bulletin SCMO.

Des nouvelles de nos membres

Si vous avez pris dernièrement votre retraite ou changé d'emploi, si vous avez reçu un titre honorifique, ou si vous avez des nouvelles ou de l'information que vous voudriez partager avec les membres de la SCMO, prière de nous le laissez savoir.

Paul-André Bolduc, Rédacteur
CMOS Bulletin SCMO.

NUMERICAL METHODS for ATMOSPHERIC and OCEANIC MODELLING:
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Books in search of a reviewer - Livres en quête d'une critique

1) Numerical Simulations in the Environmental and Earth Sciences; Proceedings of the second UNAM-CRAY Supercomputing Conference, edited by Fernando Garcia Garcia, Gerardo Cisneros, Agustin Fernandez-Eguiarte, and Romin Alvarez; Cambridge University Press, 283 pp. ISBN: 0-521-58047-1, Hardback: $69.95.

2) The Earth's Plasmasphere, J. F. Lemaire and K.I. Gringauz; Cambridge University Press, 350 pp. ISBN: 0-521-43091-7, Paperback: $90.00.

Book reviewers should provide a useful critique of the book, in 300 to 500 words, within two months. They get to keep the book as a reward!

La critique doit être soumise dans les deux mois et doit être comprise entre 300 et 500 mots. Comme boni, le livre est donné en cadeau!

Richard Asselin
Directeur des publications / Director of Publications

Significant Tornadoes 1680-1991

(ISBN 1-879362-03-1)

Significant Tornadoes Update: 1992-1995

(ISBN 1-879362-04-X)
by Tom P. Grazulis
Environmental Films, St. Johnsbury, VT 05819
Price: $95.00 US

Book reviewed by Keith C. Heidorn[1]

I am firmly convinced that everyone has some strong link with a specific weather event -- one that made or had a significant impact on their life. It may have been a blizzard or a hurricane, drought or ice storm, heat wave, cold snap, wind storm, rainbow, or thunderstorm. Weather has been a major factor and influence for most of my 50-plus years, but one event had an impact on me like no other: The Palm Sunday Tornadoes of 1965. Specifically, the one which hit the community of Crystal Lake, Illinois, 20 miles northwest of my home. My cousins lived in the path of that storm, and because of that storm, I met my future wife. Thus for me, that tornado was my most significant weather event.

Tom P. Grazulis has also been profoundly affected by a tornado: one which struck Worcester, Massachusetts on June 9, 1953. It led him to a variety of studies of tornado events and their distribution, which in 1970, became The Tornado Project. The Tornado Project has documented and classified all of the 50,000-plus tornadoes observed in the United States from 1880 to the present. Grazulis has passed every tornado through a consistent set of standards to determine its intensity according to the Fujita F-Scale. Those of intensity F2 or greater are considered as significant. (Note that the ranking is based on the scale of damage and not on wind speed or any other objective measure – even today we cannot measure the wind speed or central pressure (like a hurricane) of every tornado. Thus, a tornado with the potential to be severe may not make the list if it does no damage to structures or trees.)

The Tornado Project has produced several outstanding products: videos, books and posters. The largest in size and scope, however, is the book *Significant Tornadoes 1680-1991 and its update for the years 1992-1995.*

To describe Significant Tornadoes in a few words: it is nearly encyclopedic and vast in scope and size (not a book for reading in the bathtub or, perhaps, even in bed; it weighs eight pounds!). Most of its 1400-plus pages are devoted to cataloguing every significant tornado observed in the U.S. by state, intensity, etc. and presenting a narrative synopsis of each.

Significant Tornadoes 1680-1991 is not about the physics of tornadoes or the storms which spawn them. Instead it is about the spatial and temporal distribution of significant tornadoes: their likelihood, peak time and season of occurrence, strength, size, duration and number of casualties.

Grazulis has, however, taken what could have been a dull research report and transformed it into a fun read for any weather buff, especially the tornado-phile. It is written in language for the layperson with no prior knowledge of meteorology. (I liken it to the Baseball Encyclopedia which gives the lifetime playing statistics for all major league baseball players -- one you pull off the shelf and browse often.)

To say the book is well researched is the ultimate understatement. Grazulis and his researcher assistants have sought accounts of every storm listed in official records, searched newspaper and state historical archives, etc. to provide the most complete survey possible. In several cases the search has turned up inconsistencies in the "official" record such as the wrong location or dates, found storms missed by official records and determined that a severe storm initially believed to be a tornado was not a true tornado.

Significant Tornadoes 1680-1991 begins with about 220 pages of material on tornadoes including: what is a tornado and what is not, the atmospheric conditions likely to produce tornadoes, tornado risks, how wind speeds and Fujita categories are estimated, and a few pages of tornado myths and oddities. Most of the remaining pages are devoted to the documentation of the significant tornado catalogue and narrative (800 pages describing each storm with descriptive statistics and synopsis). All sections are interspersed with fascinating pictures of tornadoes and their damage (over 400 photographs and more than 400 drawings and maps) including the earliest known tornado photograph. This is considered to be the largest collection of tornado photographs ever published under one cover.

Except for the first 200 pages, this is not a book to sit down and read cover to cover. But I have come back many times to it when I remember or hear of a specific storm. (No, the tornado reported in northeastern Illinois on the night Harvey Haddix pitched his near-perfect game was not significant). The book's price appears high at first glance until you consider its size (1,445 pages, 8.5x11 inches). I think it is a bargain in disguise.

---

[1] Keith C. Heidorn, PhD, ACM
The Weather Doctor, June 1998

I highly recommend this volume to anyone who is interested in tornadoes. All tornado aficionados will want a copy for their library shelves as will all those involved with wind engineering, risk assessment, community safety planning and storm climatology. But Grazulis sums up the real reason I was drawn to the book in the opening paragraph:

"Nothing in the earth's atmosphere, perhaps nothing in all of nature, so uniquely combines the spectacle, terror, and random violence against unsuspecting and innocent people as the tornado. Few other phenomena can form so quickly, vanish so suddenly, leave behind such misery, and yet still be seen as beautiful."

I couldn't have said it better!

Climate Processes and Change

by Edward Bryant
Cambridge University Press

Book reviewed by William A. Gough[2]

Edward Bryant hails from Canada and is currently an Associate Professor of Geosciences at the University of Wollongong in Australia. His scientific expertise lies mainly in the field of coastal geomorphology.

Structure. The book is divided into three sections, two of which are explicitly referred to in the title: Processes, Change and Impacts. These sections are prefaced and appended by Chapters 1 and 10 respectively.

The first chapter serves to introduce relevant climatological concepts, in particular the natural occurring greenhouse effect and the earth's climate record. The last chapter is suggestively entitled, "Epilogue". The title hints at the inclusion of recent results that may shed new light on the issues discussed in the book. This proves not to be the case. Instead a more detailed discussion of natural versus anthropogenic forcing of climate is discussed. This is a crucial topic, but it may more naturally belong to the second section of the book, Change.

Content. As stated above, the book's content is divided into three sections. In the first section, climate processes are examined. This involves discussions of radiative balance, the impact of the earth's atmosphere and the important role of the world's oceans. Three important conceptual frameworks are introduced, the Palmen-Newton model of general circulation, mobile polar highs, and southern oscillation. The first of these three is the familiar three cell theory which appears in virtually all introductory climatology textbooks. The second framework, mobile polar highs, is relatively new and is a novel perspective to understand midlatitude cyclone activity. The discussion of polar front theory, cyclogenesis, and baroclinic wave theory are replaced by the theory that most midlatitude, and even some subtropical, weather is dictated by the movement of cold pools of polar air. Although the theory appears to have merit and is used effectively in the change section of the book, it may be premature to discard all previous work on the development of midlatitude cyclones. The southern oscillation is introduced in a discussion of El Niño but only fleetingly mentioned in the remainder of the book.

Although the author does, in effect, describe both wind driven and density driven ocean circulation, it is curious that he does not use the term "thermohaline" to describe the density driven circulation, a term almost universally used in the ocean community. It suggests that this is an area with which the author is not too familiar. In addition, references cited at the beginning of the chapter are somewhat old and fail to capture the tremendous development in this area over the last fifteen years.

In the Change section, three approaches are used. The first was to review climatic variations of the last million years. This provides a useful context to understand climate variations especially when teasing out natural from anthropogenic effects. The second approach is to review the proposed causes of climate variations: solar output changes, orbital parameters, geological factor such as continentality, internal climate system feedbacks, and chaos theory. The final prospective is anthropogenic influences on climate. This primarily focuses on the enhanced greenhouse effect, although stratospheric ozone depletion and 'nuclear winter' are also thrown in. Climate observations of the last century and current modelling efforts are reviewed.

Although correctly identifying the uncertainties in modelling clouds and sulphate aerosols in current climate models, other issues mainly involving the oceanic component of these models are glossed over. In particular 'flux correction' which is needed in coupled models and is introduced in the Processes section is not mentioned in this section in spite of the uncertainty this issue raises.

The final section of the of the book is labelled Impacts and deals exclusively with the impact of climate change on human health and ecosystem health. Although these topics were thoroughly treated, other impacts such as changes in physical conditions were omitted. The inclusion of what is primarily a biological section to the book is somewhat at odds with the sketchy treatment of biological factors in the previous two sections. Also, given the author's expertise, I would have expected a thorough discussion of coastal erosional issues.

Writing Style/Presentation. The book is rich in ideas and provides the reader with many follow up references. However, the author may have been too ambitious in scope. The many topics introduced appear at times disjointed and a clear, unified presentation was not

apparent. Some topics such as El Niño and nuclear winter were introduced and then left dangling. The prose was reasonably accessible and most terms were well defined. Graphs were well chosen to illustrate points in the text. The use of a plain presentation style and black and white graphics lead to a somewhat dullish appearance. This is probably compensated by a relatively low price compared to glossy hardcovers. The book would have benefitted from closer editing as a number of typographical errors are present.

Appropriate Audience. The book has a concept-oriented style (there are few, if any equations) and should be accessible to those who do not have a strong mathematics and physics background. Its structure and presentation lends itself to climate change courses offered in geography, geology, environmental studies and environmental science. It has sufficient intellectual depth, however, to attract those who approach the climate system from a more mathematical basis.

2: William A. Gough, Physical Sciences Division, University of Toronto, Scarborough.

Global warming - The Complete Briefing

by John Houghton
Cambridge University Press
New York, 251 pp, ISBN 0 521 62089 9
paperback ISBN 0 521 62932 2, 1997.

Book reviewed by Raymond Desjardins[3]

Written by John Houghton, co-chairman of the IPCC (Intergovernmental Panel on Climate Change), *Global Warming- The Complete Briefing 2nd edition* gives an excellent overview of the warming our planet faces and its possible effects. The predicted increase of 2.5°C over the next century, with the doubling of atmospheric carbon dioxide, would be the fastest global average temperature change experienced at any time over the past ten thousand years. Global warming issues are becoming an ever-increasing concern with the government and the general public. This book provides answers to some of the questions frequently asked concerning climate change. Questions such as: Are human activities altering the climate? How big are the changes likely to be? Will there be more frequent serious disasters? Will we be able to adapt to such climate changes?

This book was written for the intelligent non-scientist; however, a basic understanding of atmospheric science is useful for understanding the topics covered. The twelve chapters rely heavily on IPCC reported data. Houghton does a good job summarizing many of the IPCC's technical findings in a non-technical manner. A glossary is provided, at the end of the book, to clarify many of the scientific terms. In this second edition, Houghton has provided questions at the end of each chapter pertaining to the material discussed in the chapter.

Chapters 1-5 provide a general background on the issues surrounding global warming. These chapters describe the basic science of global warming such as: the major greenhouse gases, their anthropogenic sources, our vulnerability as a planet to such a dramatic change and current information on past climates. Most of the predictions are made based on the use of climate models.

Under the business-as-usual scenario of greenhouse gas emissions (Chapter 6), the concentration of carbon dioxide, in the atmosphere, will have doubled from the pre-industrial concentration, by the year 2030, and we will have experienced an increased temperature of 1.6°C. It is quite evident, in this chapter, that climate change is regional and, therefore, difficult to predict. However, it is predicted that the overall impact on the earth will likely be negative. Global warming is most likely to affect the frequencies and intensities of climate extremes, especially with droughts and floods. It is estimated that there are enough fossil fuel reserves to provide a steady growth of carbon dioxide emissions from fossil fuels well into the twenty-second century. We are made aware that if this growth continues, the climate change that could result would be significantly large and will possess many unpredictable features.

Houghton makes it clear that not all climate change is bad. Some countries in the Northern Hemisphere could possibly benefit from warmer temperatures. Countries, such as Canada, may experience longer growing seasons and the potential to grow new crops with a warmer climate. However, it is also brought to our attention that global warming is not a single variable issue. Negative effects such as drought and the migration of disease-carrying insects could turn what looks to be a positive issue for cooler countries into a source of problems. Climate change will also have a negative effect on sea levels, fresh water resources, agriculture and world food supply, natural ecosystems and human health, which are discussed in detail in Chapter 7.

Houghton adds an interesting twist to his book with Chapter 8 "Why Should We Be Concerned?" He departs from the previous chapters, based on recent science findings, to look at the issue on a more personal, philosophical viewpoint. He asks questions, such as, why we should be concerned and what responsibilities do we have to future generations. Many of the examples he cites are taken from religious literatures. The main message in this chapter can be summarized by the sentence "that action addressing environmental problems depends not only on knowledge about them but on the values we place on the environment and our attitudes towards them."

This leads into the final chapters of the book that point out that although there is uncertainty in some of the

consequences predicted, action must be taken because global warming is long-term and irreversible. Houghton, drawing from the precautionary principle, claims that there is no reason for postponing cost-effective measures to help our environment. There are many actions that can be taken now (Chapter 10) to help slow or possibly stabilize climate change. Suggestions for action include the reduction of deforestation or increased afforestation, increases in energy saving and conservation measures or the implementation of renewable sources of energy supply can help achieve this stabilization.

Throughout the book are informative boxes that expand on the particular topics discussed. Some of these topics include: the atmospheric temperature observed by satellites, does the sun's output change, estimating the cost of global warming, and climate change and the world food supply. The diagrams throughout this book are also very useful. However, colour in some of the diagrams would have made them much more effective, especially the ones with the smaller scales where it is difficult to distinguish between shades of gray.

Houghton's statements in the final chapter bring up a very important point. It is often necessary to deal with many of the environmental problems together, making sure not to lose sight of the importance of each individual problem when looking at the big picture. Houghton concludes by issuing a challenge to everyone to do their part in this urgent task of saving our environment.

This book describes some of the conventions and agreements that have recently taken place on Climate Change, such as the Montréal Protocol in 1987 and the United Nations Framework Convention on Climate Change in Rio de Janeiro in 1992, as well as the Conference of Parties to the Climate Convention (COP) that were held in March/April 1995 (Berlin) and July 1996 (Geneva). However, this book is already slightly out of date with the new developments associated with the third COP that took place in Kyoto, Japan in December of 1997. This is one of the reasons why the book cannot be classified as the only thing you will ever need to read about global warming. This is an area that is evolving too rapidly for any book to be rightly called the complete briefing.

3: Raymond Desjardins: Micrometeorologist, Research Branch, Agriculture and Agri-Food Canada, Ottawa, Canada.

Note from the Editor: A review of the same book appeared in the *CMOS Bulletin SCMO*, Vol.26, N0.2, p.45, and was presented by William A. Gough.

Cartes climatiques du Saint-Laurent (fleuve et golfe) pour les mois de janvier à décembre

Environnement Canada, Région du Québec
1997, 25p.

Livre présenté par André April[4]

Cet ouvrage remplace celui portant le même nom mais datant de 1984. Les cartes climatologiques du Saint-Laurent présentent les moyennes mensuelles des vents, vagues, embruns, verglaçants, visibilité, pression atmosphérique, températures de l'eau et de l'air sur le fleuve et le golfe. Les cartes sont le résultat de données compilées et analysées sur une période variant de 8 à 40 ans. Une carte de l'ouvrage présente la distribution des stations ayant servi à la cueillette des données.

Les cartes sont regroupées sous deux sections distinctes. Une première section présente les cartes climatologiques de janvier à décembre du vent, de la visibilité et des vagues et cela distinctement pour le fleuve et le golfe. Le vent est exprimé par sa vitesse moyenne et sa fréquence pour chaque direction à 8 points de compas. Les vagues sont dérivées d'un modèle théorique de génération de vagues en eau profonde et sont présentées sous forme de fréquence des vagues de hauteur supérieure à 2 mètres. La fréquence de la visibilité inférieure ou égale à 1 kilomètre est obtenue à partir de toutes les observations disponibles. Un modèle théorique est utilisé pour estimer la fréquence d'occurrence d'embruns verglaçants. Il aurait été avantageux de fournir une échelle horizontale de fréquence de vent avec l'échelle circulaire utilisée, pour rendre la lecture plus facile à certains endroits.

L'autre section rassemble les cartes climatologiques de janvier à décembre de la pression atmosphérique et des températures de l'air et de l'eau pour la zone golfe et fleuve. Les données de température de l'eau proviennent de la prise de mesure de l'eau de surface des navires. Les températures de l'air sont recueillies par les stations côtières et par l'opération d'une bouée météorologique mouillée au large. Quant à la pression atmosphérique moyenne, elle est établie à l'aide des observations des stations côtières pour une période de 8 ans.

Enfin l'ouvrage est présenté sous un nouveau format lettre qui est pratique pour l'utilisateur. Les références des différents auteurs ainsi que les études ayant servi à réaliser les cartes sont mentionnées dans le document.

4: André April, Sciences de l'atmosphère, Département des sciences de la Terre, Universitédu Québec à Montréal.

Note from the Editor: Also available in English under the title: "Climatological charts of the Saint-Lawrence (river and gulf) for the months of January to December" from Environment Canada.

Comptes-rendus du troisième atelier du groupe de travail sur les prévisions à long terme reliées à l'agriculture Dorval, Québec, les 20 et 21 octobre 1997

En Octobre 1997, le groupe de travail sur les prévisions à long terme reliées à l'agriculture (PLTRA) s'est réuni pour la troisième fois de son histoire. Le Centre météorologique canadien (CMC) à Dorval a été l'hôte de ce meeting, organisé en collaboration avec la Société canadienne de météorologie et d'océanographie (SCMO).

Plus de 25 personnes ont assisté à la réunion représentant des usagers, des prévisionnistes opérationnels en plus des chercheurs en agronomie, climatologie et météorologie. Un total de 14 communications ont été présentées, reflétant les dernières découvertes en techniques de prévision tant en météorologie qu'en agriculture. À part les présentations individuelles, deux sous-groupes se sont formés pour étudier:

- l'évaluation de l'habileté des prévisions météorologiques à long terme;
- l'impact des prévisions météorologiques à long terme sur la gestion des cultures.

La réunion s'est conclue par un résumé des discussions et des recommandations faites par les sous-groupes.

Le groupe de travail a été fondé en avril 1993 dans le but de rassembler diverses personnes (et groupes) oeuvrant dans l'art et la science des prévisions à long terme et leurs applications tant en agriculture, en demandes en énergie qu'en ressources hydrologiques. Vu l'intérêt grandissant des prévisions à long terme, il est à espérer que ce Compte-rendu sera une référence utile pour les chercheurs ainsi que pour les usagers et encouragera les échanges d'idées vers une meilleure compréhension des besoins environnementaux et de société. Nous espérons finalement que ce Compte-rendu promouvra l'intérêt du groupe de travail sur les prévisions à long terme reliées à l'agriculture.

Pour plus de détails sur le prochaine réunion du groupe de travail sur les PLTRA, qui devrait se tenir à l'automne 1999, prière de contacter Louis Lefaivre au CMC (tél: 514-421-4659; fax: 514-421-4657; courriel: louis.lefaivre@ec.gc.ca) ou Madhav Khandekar (tél: 905-940-0105; courriel: madhavk@shaw.wave.ca).

Les comptes-rendus de la dernière réunion sont disponibles (en anglais seulement) au coût de $15 (canadiens). Pour ceux intéressés, prière d'envoyer un chèque au nom du Receveur général du Canada à l'adresse suivante:

Comptes-rendus du PLTRA-III (Louis Lefaivre)
Centre météorologique canadien
2121, route transcanadienne
Dorval (Québec) H9P 1J3

Proceedings of the 3rd Long-Range Weather and Crop Forecasting Work Group meeting Dorval, Québec, October 20 and 21, 1997

In October 1997, the Long-Range Weather and Crop Forecasting (LRWCF) work group met for the third time in its history. This meeting was hosted by the Canadian Meteorological Centre (CMC) in Dorval and was organised in collaboration with the Canadian Meteorological and Oceanographic Society (CMOS).

The meeting was attended by over 25 participants representing the user community, operational forecasters as well as researchers in agronomy, climatology and meteorology. A total of 14 papers were presented, showing the latest findings in weather and crop forecasting techniques. Besides individual presentations, two sub-groups were formed to study:

- The assessment of the skill in long-range forecasting techniques;
- The impact of long-range weather forecasts on crop management.

The meeting concluded with a summary of the discussions and recommendations made by the sub-groups.

The work group was established in April 1993 to bring together various people (and groups) working in the art and science of long-range forecasting and its application to agriculture, power requirements and water resources. In view of the growing interest in long-range forecasting, it is hoped that these Proceedings will be a useful reference for researchers as well as the user community and may help foster an exchange of ideas towards a better understanding of environmental and societal needs. We further hope that these Proceedings will promote interest in the Long-Range Weather and Crop Forecasting Working Group.

For more details on the next LRWCF work group meeting, that should be held in the Fall of 1999, please contact Louis Lefaivre at CMC (phone: 514-421-4659; e-mail: louis.lefaivre@ec.gc.ca) or Madhav Khandekar (phone: 905-940-0105; e-mail: madhavk@shaw.wave.ca).

Proceedings of this last meeting are available at a cost of $15 (Can). For those interested, please send a cheque to the Receiver General of Canada at the following address:

Proceedings of the LRWCF-III
(Attn: Louis Lefaivre)
Canadian Meteorological Centre
2121, TransCanada Highway
Dorval, Québec, H9P 1J3

PROJECT ATMOSPHERE REPORT

The following report by Ms. Marlene V.C. Hume of Oakville Trafalgar High School (Ontario) is on her participation in the Project Atmosphere Workshop under the sponsorship of CMOS and of the Canadian Council for Geographic Education. The Workshop, which is offered by the American Meteorological Society with the support of the National Oceanic and Atmospheric Administration and the National Science Foundation, took place in Kansas City, Missouri on July 20-31, 1998. Its aim is to provide information on atmospheric sensing, analyzing and forecasting to pre-college teachers of atmospheric science topics.

Note from the Editor.

After participating in Project Atmosphere, as "Hurricane Bonnie" (Aug. 27-28/98) made her way toward the Carolinas, I had a better understanding of how the cyclonic system had developed and what combination of technology (satellites and computers) and human resources were required to bring the pertinent information to those in need. Jerry Jarrell (Director of the National Hurricane Center, Florida) had described the steps taken to identify, track and classify a hurricane, and a pilot from the Aviation Weather Center (Kansas City, MO) described how he flies through the hurricane to record data. (Seats are available for civilians and ... Yes, I would like to do that too!)

Project Atmosphere provided an opportunity to see the most up-to-date technology used in weather forecasting in North America. The Advanced Weather Interactive Processing System (AWIPS) was the most interesting. It puts together information from satellites, Doppler radar and weather station monitors to display up-to-the-minute weather conditions (locally and nationally) with the capacity to predict the weather up to 14 days in advance. Participants were also introduced to a digitized voice weather broadcast where the computer collates and transforms the instrumental data into words.

Lecture topics included: weather systems (highs and lows), the coriolis effect, seasons, tornadoes, El Niño, thunderstorms, hurricanes, weather radar, satellites and weather forecasting.

The most valuable lesson learned was the emphasis placed on interpretation, and in the end that belongs to the people who gather the information. Like a geographer, meteorologists look for the familiar patterns and make predictions based on experience. Also important to the Project Atmosphere program is the networking, sharing with 24 other teachers (22 Americans and two South Africans - elementary and secondary school geographers, mathematicians, scientists) ideas and plans that will contribute to ongoing learning for students, peers and myself.

This program is a great opportunity for professional growth and I appreciated the chance to participate.

Thank you CMOS for this opportunity.

Marlene V.C. Hume
Head of Social Sciences
Oakville Trafalgar High School.

Christmas Gift Idea !!!

Looking for a great $5 gift idea! The International Year of the Ocean Secretariat has just released its Commemorative Calendar for 1999. This oceanic masterpiece featuring photos by DFO employees from across the nation would make an outstanding Christmas gift!!! Call (613) 991-5936 to order yours while supplies last. Proceeds go to the Youth for the Oceans Foundation.

Cadeau pour Noël !!!

Vous cherchez un magnifique cadeau original à 5 $? Pour Noël peut-être? Le Secrétariat de l'Année internationale des océans vient justement de lancer son calendrier commémoratif de 1999. Ce chef-oeuvre sur les océans renferme des photos fournies par les employés du MPO de tout le pays. Composez le 613-991-5936 pour commander les vôtres, tant qu'il y en aura. Les profits seront versés à la Fondation jeunesse pour les océans.

Report of the International Expert Meeting on the Participation of Women in Meteorology and Hydrology
December 14 - 19, 1997
Bangkok, Thailand

by Nancy Cutler, Director General
National Weather Services Directorate, AES

Introduction

This Expert meeting was held to further sensitise national authorities on the need to promote the advancement of women and as a follow-up to the UN Fourth World Conference on Women (Beijing - 1995). The meeting was attended by 89 meteorologists and hydrologists from all WMO Regions representing 67 Members of WMO.

The Conference was preceded by the completion of a survey on the activities of women in the affairs of the World Meteorological Organization and in the fields of meteorology, hydrology and related geophysical sciences. The survey summarized the role of women in decision-making and requested country-specific information on women's participation in scientific and technical education, professional societies and employment demographics within governments, the private sector and academic communities. The overall result of the WMO survey had shown that women were under-represented in the professions of meteorology and hydrology, while relatively few women from among the considerable number who embarked on training, actually followed careers in those fields. Information and data gathered for the survey, is the most comprehensive global study of women's involvement in atmospheric and geophysical sciences, for the period 1991-1995; 94 of the 186 Member countries and territories of WMO responded. A report on the questionnaire is available from the WMO by contacting the Information and Public Affairs Office at 011.41.22.730-8315 (Fax) 733-2829 or through e-mail at ipa@www.wmo.ch

I chaired the meeting and Ms. Marie McPhee, Senior Meteorologist, Newfoundland Weather Centre, Gander also attended. Throughout the conference, women spoke openly and passionately about their career experiences, their commitment to meteorology and hydrology, and their personal aspirations and expectations. The network of women that was created and the commitment to seek ways of helping each other are great achievements.

Objectives

The objectives of the expert meeting were, inter alia, to:

- Encourage women to choose meteorology, climatology or hydrology as a career;
- Increase the participation of women meteorologists and hydrologists in the programmes and activities of the constituent bodies of WMO, and their representation in the WMO Secretariat;
- Encourage the creation of equal opportunities for women to attain senior positions in their chosen fields of atmospheric and geophysical sciences.

The Expert meeting addressed specific actions that could be taken by women, the National Meteorological and Hydrological Services (NMHSs) and the WMO Secretariat to meet five major goals, including:

- Achieving equity in obtaining education and training for men and women;
- Developing and implementing career and promotion strategies which provide equal opportunities for both women and men;
- Creating a work environment that is conducive to the productivity and morale of the staff;
- Increasing the participation of women scientists in the work of the WMO;
- Increasing the number of women scientists and other professionals among staff of the WMO Secretariat.

The Meeting Statement stresses the necessity of men's support for women's access to equal opportunities for their advancement in science in general, and in meteorology and hydrology in particular. In noting that gains for women would benefit all society, the Statement had called on governments and directors of NMHSs to take the necessary steps to:

- Promote the education of girls and women of all ages in science and technology to prepare them for entering scientific professions such as meteorology and hydrology;
- Expand opportunities for hiring and promoting women in meteorology, including climatology, and in hydrology, in the NMHSs and develop programmes in management for female professionals, scientists, and technical administrative staff;

- Identify promising female candidates for participation in the work of WMO constituent bodies, and for undertaking expert missions, consultancies, feasibility studies and other work required for WMO, as well as to nominate women for training and education opportunities;
- Ensure the participation and contribution of women in regional technical conferences on management of NMHSs, and designate national focal points for women's issues;
- Encourage qualified women to apply for appropriate vacant positions in order to increase the prospects for better representation of women in the WMO Secretariat.

The Conference

Professor Obasi, the WMO Secretary General, opened the session noting the commitment of the United Nations and WMO's Executive Council to take measures to increase the participation of women at all levels. He expressed appreciation to the Government and to Dr. Patipat, the Deputy Director-General of the Meteorological Department of Thailand for hosting the expert meeting, and to the USA and Canada for their contribution towards the organization of the event.

Issues

Women and men from developing and developed countries are faced with many deterrents such as civil unrest, education, laws pertaining to societal norms, workplace culture and family related matters. Some consider the current low rate of women participating in meteorology and hydrology (23% worldwide) as an accurate reflection of the number of women with the ability and desire to contribute to these fields. Participation of women from countries such as the Ukraine, Latvia and Uzbekistan have participation rates of 79%, 72% and 55% respectively which disprove this.

Civil unrest

Foremost concern must be given to women who live in areas ravaged by war or civil unrest and whose main concerns are health and safety for self and family. Ms. Joyce Koffa, a Deputy Manager from the Meteorological Department of Liberia spoke on how the civil war has affected her department. Airports and valuable equipment have been destroyed. Some of the basics, such as an observer's handbook, that we would take for granted, were lacking. Ms. Luch Sorany, an engineer from the Department of Meteorology and Hydrology in Cambodia, also mentioned the lack of instrumentation as a result of the civil war. The war had an ironic effect of giving women in her country more opportunities but in a "gutted" service. Until civil authority returns, the potential contribution of women from war-torn countries to the world community will not be realized. The personal stories of some of these women were humbling.

Access to education

Women in some countries do not receive a basic education let alone a university education. In Gambia, for instance, only 20% of women are literate while 55% of their men are. In Kenya over 70% of those illiterate are women. In some developing countries, males are given preference to schooling over the females especially when funds are limited. In many parts of the world, basic education is available to everyone while specialized training such as meteorology and hydrology is not. Other nuances include the situation in Colombia where there are no barriers to education for women; however, to study meteorology, one must travel to Spain. This is both an expensive undertaking and one which culturally excludes women with children. In North America, women have unlimited choices for education but do not choose the physical sciences in significant numbers, and those that do, seldom choose meteorology.

Legal and societal barriers

Different laws or regulations can become obstacles for women wanting to become a meteorologist or hydrologist. Many women spoke about their constitutional laws giving them rights and protection. In many cases, this was a recent development. However, some domestic laws override their constitution laws. Mary Muthoni Githinji of Kenya highlights this in her paper: ".. customary laws, for example, in Kenya are treated as superior to constitution yet the constitution is the supreme law of the land." In some countries, women are not allowed to work nights which in turn excludes them from operational meteorology. In some countries, the met service is within the military that does not allow women to enlist, as in Italy.

Work-place culture

Work-place culture impacts women regardless of the country. If the culture is composed primarily of one segment of the population, those outside that segment will have a difficult time fitting in. It is human nature to feel comfortable and affiliate with those similar to ourselves. In such organizations, they expect the minority to assimilate. But, by not recognizing that there are differences, organizations will continue to lose the newcomers. We can empathize with those women breaking into areas of employment in which few or no women now work. Female meteorologists in Canada are now accepted as part of the team; a battle won by the women only within the last two decades.

The glass ceiling is an almost universal concern as is the lack of women in management. Even in countries like the

Ukraine and Latvia where women dominate the workplace, men dominate the management level. An understanding needs to be developed why women are not equally represented in management. Possibilities range from discrimination, to lack of time in the service due to the challenge of combining motherhood and career.

Family issues

Maternity leave benefits vary across the world and one is tempted to draw conclusions on their impact on the numbers of women in the workplace. There was a broad spectrum of benefits making it difficult to delineate between developed and developing countries. Countries with economies in transition and some west European countries seem to have the most generous benefits and the highest participation rate of women. Many of these countries have maternity leave in 4-6 months' range. One of the least generous packages belonged to the USA, which gives but 12 weeks of unpaid leave to new mothers (the USA has a 7% participation rate). Other innovative allowances have been instituted in some other countries. In Uganda, women had no night shifts in the first year after the birth of the child. In Chad, women are allotted 2 hours per shift for nursing.

Within the conference, gender and family issues were joined. The challenge of dual working couples where the female assumes almost total responsibility for running the household is quite common. Combining shift work with care for young children can be a deterrent to many people. Solutions such as having sleeping quarters for children in the workplace (China) are being applied Mitsubishi Motors in the USA agreed that women with preschool children could work fewer midnight shifts without impacting their career progression, particularly their ability to become shift supervisors.

Women who make allowances for children are frequently viewed as less committed to the workplace. At the conference, it became clear that Environment Canada is one of the more generous organizations with regard to family issues; with such innovative policies as on-site child care, flex-time, compressed work week, variable hours, flex-place, telework etc. While most of these tools offer scant assistance to those working operations, they are an enormous help to people who work days and should be applauded.

PROCEEDINGS

Ms. Kayoko Mizuta, the Deputy Executive Secretary of ESCAP-United Nations (Economic and Social Council-Asia Pacific) spoke about the principles for mainstreaming gender perspectives in the United Nations and defined it as "the process of assessing the implications for women and men of any planned action, including legislation, policies or programmes, in any area and at all levels. It is a strategy for making women's as well as men's concerns and experiences an integral dimension in the design, implementation, monitoring and evaluation of policies and programmes in all political, economical and societal spheres so that women and men benefit equally and inequality is not perpetuated. The ultimate goal is to achieve gender equality."

Dr. Karin Labitzke, Professor of Meteorology at the Free University of Berlin who started her university education in the 1950s, expressed her gratitude to her supervisor in university for encouraging her. He had a positive attitude towards women in science. She felt that a woman in a position of authority acts as a magnet to other women. For example, being a professor and director of a research group, she has attracted many female students into the field of meteorology. Dr. Labitzke maintains that women should be judged by performance and should not rely on affirmative action. The main focus of her speech was the role that women played in the interaction of the ecosphere and the anthroposphere as part of the global change.

Ms. Karimanzira from Zimbabwe, Mrs. McGill from Jamaica and Ms. Tang from China gave presentations on their respective NMHSs. They described the historical as well as the present role of women in their services.

Mr. William Thomas, a management consultant from the USA, spoke about facilitating change in organizations. He covered the different reactions to change as well as the various stages of change. He discussed the speed of and resistance to change and the different roles that people play during change.

Ms. Trish Hart (UK) gave a presentation on the Human Resource Development in the UK. I spoke about some organizational tools for change that are used in Canada. Dr. Susan Zevin (USA) gave an inspiring speech on personal tools that can be used for change which brought spontaneous applause from the delegates.

Ms. H. Kootval (WMO Secretariat) described the structure and baseline statistics of the WMO and the Secretariat. Ms. E.Gorre-Dale discussed the survey to collect baseline statistics on the participation of women in meteorology and hydrology. Ms. Leong (Malaysia) briefly explained the result of this survey.

RECOMMENDATIONS

The conference attendees were divided into six discussion groups given the task to develop recommendations for NMHSs and the WMO. Though faced with language and cultural barriers, several of the multilingual people spread amongst the groups translated for the ones who could not speak English. Diverse opinions and perspectives were expressed; however, common ground was found.

A. PARTICIPATION OF WOMEN IN THE WORK OF THE WMO

GOAL: Increase the participation of female scientists in the work of the WMO so that it becomes representative of the number of women in meteorology and hydrology.

Notwithstanding the number of accomplished female meteorologists and hydrologists, an analysis of attendance at WMO constituent body meetings shows participation by female meteorologists and hydrologists is significantly lower proportionately than the number of female participants in NMHSs. Although attendance is increasing at the WMO Congresses, the ratio of women to men is decreasing.

WOMEN SHOULD:

1. Become knowledgeable (WMO's Home Page, WMO Bulletin, WMO publications) about the WMO and inform their supervisors and Permanent Representative (PR) that they are interested in volunteering to work on WMO activities/programs that are relevant to their work and to their NMHSs.

2. Become an "expert" in an area of work and actively participate in professional meetings, seminars and special projects. Volunteer to provide scientific expertise whenever and wherever it is needed.

3. Learn at least one of the WMO official languages in order to become an active participant at international meetings.

4. Organize informal meetings of women at professional meetings and conferences to share knowledge and experiences. Establish a women's communication network within each WMO Regional Association.

NMHSs SHOULD:

1. Involve more women from the NMHSs in the work of WMO at all levels of the constituent bodies, to nominate more women to be members of Technical Commissions and to serve on working groups and as rapporteurs, to increase involvement in training events and conferences.

WMO SHOULD:

1. Incorporate the role of women in strengthening the NMHSs as an agenda item in WMO Technical Conferences on Management of NMHSs. Provide resources to hold follow-on Expert Meetings on Women in Meteorology and Hydrology during the next financial period.

2. Establish a resource book of female scientists and experts for use by the WMO and NMHSs. Select more qualified female scientists for scientific lectures at constituent body meetings. Identify qualified women to undertake WMO missions, consultancies, feasibility studies and as contractors to WMO using the resource book.

3. Encourage the PRs to consider and identify female scientists for participation in the work of constituent bodies, working groups and expert meetings, training events, seminars and conferences. Given the low historical participation of women in the WMO, ensure that WMO letters encourage PRs to nominate and involve more women in the work of the WMO.

4. Monitor the participation of women in the WMO constituent bodies, education and training programs during each financial period and publish the results. Publish more interviews with prominent female scientists in the WMO Bulletin and create a sub-page for women's issues on the WMO home page.

B. REPRESENTATION OF WOMEN IN THE WMO SECRETARIAT

GOAL: Increase the representation of female scientists and other professionals in the WMO secretariat.

The number of female scientists and other professionals in the WMO Secretariat is 23 compared to 93 men, as of December 31, 1996. Of the 23 professional women, 3 are scientists. There are many prominent and promising female scientists that might be unaware of professional opportunities at the WMO. The work of the WMO is continually changing and new people with new techniques and ideas could be of benefit to the organization. There are currently no women in senior management positions at WMO.

WMO SHOULD:

1. Strongly encourage NMHSs to inform and advertise professional vacancies in the WMO to qualified women to apply for appropriate professional positions in order to increase the prospects for better representation of women in the WMO Secretariat.

2. Consider selection of qualified female candidates on the short lists for positions including those of upper management at the WMO Secretariat.

3. Encourage the NMHS Directors to identify promising women for Junior Professional Officer and seconded positions. Encourage NMHSs to contact the university community to have female scientific professors choose to work at WMO during their university sabbaticals.

C. EDUCATION AND TRAINING

GOAL: Women should have an equitable chance to obtain required education and training.

WOMEN SHOULD:

1. Demand equal opportunities for training and education in universities and other educational institutions.

2. Become knowledgeable and aware of education and training opportunities, not only within their own countries but in other countries and international organizations.

3. Build a network with other women and colleagues to exchange information, to be supportive and to coordinate their efforts. Support the formulation of an International Association of Women in Meteorology and Hydrology.

4. Work with their supervisors, training managers and /or a mentor to establish a training plan. Utilize long distance learning programs where available.

5. Promote the education of girls in science and mathematics by giving briefings at schools, arranging field trips to weather offices and establishing internships at the NMHSs.

NMHSs SHOULD:

1. Provide more opportunities for women to participate in training courses and provide flexible working hours for those who want to study.

2. Encourage universities and other educational institutions to create meteorological and hydrological courses within their scientific departments. Create more public awareness about the need for more female students to take up meteorology and hydrology and related science subjects. Develop a standard syllabus for meteorology and hydrology for primary and secondary schools.

3. Encourage the meteorological and hydrological private sector to assist with funding training activities.

4. Promote in-country training for those unable to leave their families. Obtain Computer Assisted Learning modules in meteorology for use at the NMHSs.

5. Facilitate exchange visits between NMHSs.

WMO SHOULD:

1. Encourage NMHSs to offer women equal training opportunities. Develop a policy to encourage funding for training of women. Ensure that female nominations are included when awarding fellowships, and organizing training events.

2. Provide basic equipment maintenance training to those who work in isolated areas to ensure self-sufficiency.

3. Publish statistics on participation of men and women in WMO training activities.

4. Give particular attention to training eligible women from developing countries in the WMO education and training program.

D. CAREER AND PROMOTION OPPORTUNITIES

GOAL: To develop and implement career and promotion strategies.

WOMEN SHOULD:

1. Prepare and implement a plan for their own career development, listing clear goals and the required skills and experiences to achieve them. Apply for jobs and positions and resist getting discouraged if they are not selected.

2. Work on the establishment of a regional network for women in meteorological and hydrological services starting with the list of participants of this meeting. Pass on experiences that may be beneficial to other women.

3. Adopt a mentor and become a mentor. Organize seminars or workshops to present their work and to learn about other scientists' work. Join and become very active in professional associations.

4. Lobby their government to change the law, where the meteorological service is the military establishment and women are not allowed to be part of the military.

NMHSs SHOULD:

1. Promote recruitment of women at all professional levels.

2. Develop a long-term staffing plan with the goal for female representation of women in the NMHSs to be proportional to the number of female meteorologists and hydrologists in the population.

3. Create a national register of professionals in meteorology, hydrology and related fields.

4. Establish special project units as a method of developing employees. Employees would carry out special projects for a specified time period that would not only benefit the NMHSs but would provide individuals career development.

5. Regularly provide statistics on gender, including position, grade and salary.

6. Explore managerial strategies applied in other NMHSs to promote participation of women.

E. WORK ENVIRONMENT POLICIES AND PRACTICES

GOAL: Create a work environment that is conducive to increasing the level of productivity and improve the morale of the staff by having supportive policies and practices.

Studies have shown that staff of any organization irrespective of the level of responsibility can be more productive and have more personal and job satisfaction when working in a positive environment which is collegial and free of harassment. The following could be helpful in achieving such an environment for women in meteorology and hydrology.

The importance of the family cannot be overlooked in the workplace because both men and women often have family responsibilities. Directors of NMHSs should be encouraged to use already existing standing regulations in their countries in the most flexible manner with respect to family care issues.

WOMEN SHOULD:

1. Promote collaboration and cooperation rather than competition. Act in a professional manner at all times.

2. Work towards creating national and international networks of women who exchange ideas on issues of family needs and provide mutual support for implementing ideas within their respective organizations.

3. Be encouraged to join other women's organizations in their country in lobbying government to address women's issues.

4. Maintain contact with developments in the workplace when on maternity or other long leave and/or explore the possibility of tele-work or research work.

5. Encourage their husbands to share family responsibilities.

NMHSs SHOULD:

1. Promote equal treatment of men and women and strengthen professional working relationships.

2. Introduce an appraisal system that will make it possible to appraise performance of managers by employees and vice versa.

3. Use the WMO focal point on women's issues to coordinate and address all issues of concern to women in the work place.

4. Work to ensure that there should be no fear of loss of job because of maternity issues.

5. Make an effort to establish day care centres near the work place.

6. Actively look at ways to incorporate job sharing, part-time work, flex-time, flex-place and tele-work in the NMHSs to benefit not only the women but the men employees.

Final Note

The report from the meeting focused on the role and progress of women in their respective Services in response to changes taking place in NMHSs; techniques and policies that could offer practical solutions to women to overcome some of the problems they faced when entering a career or an establishment system which would consider them as outsiders; and the results of the analysis of a survey conducted by WMO in 1996 on the participation of women in meteorology, operational hydrology and related geophysical sciences. Although there are marked differences in the practices and mode of operation of the different NMHSs, there are striking similarities in the issues related to every stage of career development experienced by women - beginning with equitable access to education and training at schools and universities. As women embark on a career in the NMHSs, other issues emerge related to managing family responsibilities and achieving a home/work balance which quite often makes it difficult for women to compete on an equal footing with their male colleagues in achieving management positions. Stressing that women desire to be evaluated solely on merit, not gender, the report brings to our attention that although some women had received very good support from their NMHS management and were readily accepted based on their work performance, the majority had indicated that they had to overcome some form of overt or subtle adverse treatment by their colleagues before being accepted.

Proposed Workshop on Global Warming in Arctic Canada

Goal

The Workshop will develop, for the new millennium, an action plan which lays out a unified effort to:

a) observe in a timely manner the consequences of global warming on Canada's cryosphere;

b) identify, within a circumpolar context, short and long term research gaps that are inhibiting our abilities to lower uncertainties of climate change prediction, and assessing potential impacts; and

c) prepare the infrastructure and policy adaptations required to address impending social, economic and resource issues.

Planning is required now if we are to develop a credible climate monitoring and research program for the North. The Workshop will provide decision-makers with a vision for coordinating international climate science and observational activities in the North, and will represent contributions to Canada's national climate program as well as the World Climate Research Programme climate and cryosphere programs.

Format of the Workshop

Participants will be limited to about 50; this includes Federal Departments, the Canadian academic community, external invited participants from the US and Europe, and from other groups, such as granting bodies, politicians, decision-makers, Arctic Ocean Science Board and/or IPCC representatives, etc. Participants will be selected on the basis of broad experience and vision for Arctic climate research; they are to be challenged to think outside of their immediate area(s) of research, and to contribute to the entire spectrum of climate issues and concerns for Canadians. Participants will discuss, broadly, what is known and what is not known, and will suggest new ideas based on a series of powerful realities and scenarios being proposed by recent global observations of Arctic climate change.

Rationale

Experts world-wide are repeating clear and alarming messages about the consequences of inaction by the research community to provide nations with tools and strategies to respond to climate change. As global warming occurs, it is in the high latitudes that climate change and its impacts will be greatest. As warming occurs within the Arctic, then positive feedback effects involving planetary albedo and the world ocean circulation will give the Arctic cryosphere a significant but poorly-understood leverage to impact the global climate system. Warming of the Arctic may also trigger the massive release of GHGs stored within cryosphere reserves. Global change scenarios affecting northern systems include the meltdown of polar sea-ice and glaciers, flooding of coastlines, altered moisture transport patterns, and modified migration and distribution of species, both marine and terrestrial.

Planning Committtee

M. Bergmann, DFO/FWI, Winnipeg; E. Carmack, DFO/IOS, Sidney; B. Goodison, DOE/AES, Downsview; T. Prowse, DOE/NHRI, Saskatoon; M. McGonigle, University of Victoria , M. Burgess, NRCan.

Date and Location

The proposed date is February/March 1999 in Victoria, B.C. For further information, please contact Marty Bergmann at BegrmannM@dfo-mpo.gc.ca.

CMOS Prizes and Awards: First Reminder

Of late interest in nominating fellow members of CMOS and others for prizes and awards has fallen off. Why? Is there no one worthy of a CMOS award? Or is it simply a case of I will get around to it later and then Oops it's too late. Your call for nominations, Centres and Chapters is now underway and we want to hear from you well ahead of the deadline. In case you don't remember the award categories are:

President's Prize;	Tully Medal in Oceanography;
Applied Meteorology;	Applied Oceanography;
Operational Meteorology;	Graduate Student;
Environmental Citation;	Media Weather Presentation.

Each category has different and specific nomination criteria which you can check out on our Web site in one of two places - the CMOS By-Laws or under Prizes and Awards It is not difficult, just do it now! Send your nominations to:

Dr. Kent Moore (Chair CMOS Prizes & Awards Committee)
University of Toronto
60 St. George Street
Toronto, ON M5S 1A7
Tel: (416) 978-4686; Fax: (416) 978-8905
e-mail: moore@atmosp.physics.utoronto.ca

or to: Mike Leduc (Secretary)
e-mail: mike.leduc@ec.gc.ca

with copies to CMOS:
Suite 112 McDonald Building
150 Louis Pasteur
Ottawa, ON K1N 6N5
Tel: (613) 990-0300; Fax: (613) 993-4658
e-mail: cmos@ottmed.meds.dfo.ca

No later than January 31, 1999.

Neil Campbell
Executive Director

CALL FOR PAPERS
33RD ANNUAL CMOS CONGRESS

The Montréal Centre of the Canadian Meteorological and Oceanographic Society (CMOS) and l'Université du Québec à Montréal (UQÀM) will host the 33rd Annual CMOS Congress at UQÀM from 31 May to 4 June, 1999. The theme is "Environmental Prediction", to reflect emerging major national and international initiatives in this domain. Contributions are particularly sought on theoretical and practical aspects in the following areas: coupled atmosphere-ocean modelling, waves in the atmosphere or oceans, atmospheric and oceanographic circulations, data assimilation, operational meteorology, transient climate change, climate predictability, cloud physics, transport and diffusion of pollutants, environmental emergency response, and environmental decision support systems. In addition to invited and contributed papers relating to the general theme, sessions will be held on other aspects of meteorology and oceanography, depending on contributions. Presentations are also solicited for a special session on education in meteorology and oceanography.

Abstracts on any topic in meteorology and oceanography will be received until **February 5, 1999**. Since both oral and poster sessions will be organized, authors should indicate their preference. Authors are strongly encouraged to submit abstracts, not to exceed 300 words, interactively through the conference web site at the following address:

www.cmc.ec.gc.ca/rpn/cmos99

A template for sending an electronic abstract can also be obtained from this web site. The Scientific Program Committee will greatly appreciate all efforts to submit abstracts electronically, as this will facilitate the approval and printing process, and produce a faster response to the authors. Hard- (paper) and soft-copy (diskette) submissions can also be sent by mail to:

Harold Ritchie, Chair
CMOS Congress '99 Scientific Program Committee
Recherche en prévision numérique
Atmospheric Environment Service
2121 Trans-Canada Highway, 5th Floor
Dorval, QC, H9P 1J3
Canada

Commercial exhibits will be on display during the Congress. For further information contact Harold Ritchie - Scientific Program Committee (Harold.Ritchie@ec.gc.ca, 514-421-4739), Jean-Guy Cantin - Local Arrangements Committee (jean-guy.cantin@sympatico.ca, 514-748-9480) or Robert Mailhot - Commercial Exhibits (Robert.Mailhot@ec.gc.ca, 514-421-7200).

Following the CMOS Congress, the World Meteorological Organization (WMO) will hold the Third WMO Symposium on Data Assimilation in Meteorology and Oceanography from 7 to 11 June 1999 in Québec City, QC. Those interested in receiving information about this symposium can subscribe to its mailing list by sending the following one line message

subscribe-omm your_email_address
to "majordomo@ec.gc.ca".

INVITATION À PRÉSENTER DES COMMUNICATIONS
33e CONGRÈS ANNUEL DE LA SCMO

Le Centre de Montréal de la Société canadienne de météorologie et d'océanographie (SCMO) et l'Université du Québec à Montréal (UQÀM) seront les hôtes du 33e Congrès annuel, qui se tiendra à l'UQÀM du 31 mai au 4 juin 1999. Le thème choisi, "La prévision environnementale", reflète les importantes initiatives de recherches qui émergent dans ce domaine aux niveaux national et international. On recherche particulièrement des contributions, couvrant les aspects tant théoriques que pratiques, dans les domaines suivants: modélisation atmosphère-océan, ondes dans l'atmosphère ou l'océan, circulations atmosphérique et océanique, assimilation des données, météorologie opérationnelle, changement transitoire du climat, prédictibilité du climat, physique des nuages, transport et diffusion des polluants, réponse aux urgences environnementales et systèmes d'appui aux décisions environnementales. Outre les communications présentées par les conférenciers invités et les autres participants reliées au thème général, des séances additionnelles sur d'autres aspects de la météorologie et de l'océanographie seront organisées, selon les contributions reçues. On recherche aussi des contributions pour une séance spéciale sur l'éducation en météorologie et en océanographie.

On peut faire parvenir des résumés sur des sujets liés à la météorologie ou à l'océanographie jusqu'au **5 février 1999.** Puisque nous organiserons des séances orales et d'affichage, nous prions les auteurs d'indiquer leur préférence. Les résumés ne doivent pas dépasser 300 mots. Nous encourageons fortement les auteurs à nous les soumettre interactivement en utilisant le site WEB du

congrès à l'adresse suivante :

www.cmc.ec.gc.ca/rpn/scmo99

On peut obtenir un formulaire pour nous faire parvenir un résumé par voie électronique au même site WEB. Le Comité du programme scientifique vous serait grandement reconnaissant de soumettre les résumés par voie électronique puisque cela facilitera les processus d'approbation et d'édition tout en accélérant la réponse aux auteurs. On peut également nous les soumettre sous forme papier ou sur disquette, par courrier, à :

Harold Ritchie, président
Comité du programme scientifique
Congrès de la SCMO '99
Recherche en prévision numérique
Service de l'environnement atmosphérique
2121 Route Trans-canadienne, 5e étage
Dorval QC, H9P 1J3
Canada

Une exposition commerciale aura lieu pendant le Congrès. On peut obtenir plus de renseignements auprès de Harold Ritchie - Comité du programme scientifique (Harold.Ritchie@ec.gc.ca, 514-421-4739), Jean-Guy Cantin - Comité local d'organisation (jean-guy.cantin@sympatico.ca, 514-748-9480) ou Robert Mailhot - Exposition commerciale (Robert.Mailhot@ec.gc.ca, 514-421-7200).

À la suite du Congrès de la SCMO, l'Organisation Météorologique Mondiale (OMM) tiendra son Troisième Symposium sur l'Assimilation des données en météorologie et océanographie du 7 au 11 juin 1999 à Québec, QC. Ceux qui sont intéressés à recevoir de l'information concernant ce symposium peuvent s'inscrire à sa liste d'envoi électronique en envoyant le message suivant sur une seule ligne

subscribe symposium-omm votre_adresse_électronique
à "majordomo@ec.gc.ca".

CALL FOR PAPERS

IUGG-99 XXII General Assembly
Inter-Association Symposium
(IAPSO, IASPEI, IAVCEA, IAHS, IAMAS, IAG, IAGA, IUGG Tsunami Commission, ILP)
on
GEOPHYSICAL HAZARDS, RISK ASSESSEMENT, MITIGATION AND WARNING SYSTEMS
Birmingham,U.K. 22-27 July, 1999

Geophysical hazards, such as earthquakes, volcanic eruptions, avalanche, landslides, floods, droughts,tsunamis,storm surges, wildfire, tropical cyclones and extreme weather events constitute major problem in many developing and developed countries. With the growth in world population, the increasing pressure on natural resources in newly developing areas, and the increasing cost and sophistication of engineering structures and technical installations, there is an urgent need to seek to understand the potential threats posed by natural hazards and to ascertain increasing preparedness and appropriate ways of mitigating the damaging effects.

Much has been accomplished since the onset of the UN International Decade for Natural Disaster Reduction (IDNDR), which challenged all members of the international community to take a proactive stance to reduce threats before disasters strike. In parallel with these developments, the international scientific community has been engaged in global risk management through the Inter-governmental Panel on Climate Change (IPCC). The possible hazards associated with climate change have been examined, their impacts assessed, and options for mitigation and adaptation have been considered.

The aim of this Inter-Association Symposium is to stimulate synergistic interactions between all geophysicists on common interests in the field of natural hazards, especially across disciplinary boundaries. The scope seeks through contributed prsentations to recognize the technical and scientific progress made during the last ten years in research related to any aspects of geophysical hazards to accomplishing the goals set forth for the Decade, including risk assessment; the application of known preparedness and mitigation approaches; and the development and use of scientific and engineering knowledge to improve warning systems, the disaster preparedness and mitigation in practice.

In order to set the stage for this symposium, a series of invited keynote lectures will be presented on July 22 to evaluate the state-of-the-Science in geophysical hazards and risks.

ABSTRACT SUBMISSION:

The deadline for submission of abstracts (English or French) is **15 January 1999.** Instructions for abstract submission and format can be found at the IUGG website:

http://www.bham.ac.uk/IUGG99/

or by writing to any of the co-convenors listed below. Please specify the symposium code as 'JSP23' and the symposium title as shown above.

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RADARSAT INTERNATIONAL APPOINTS CHIEF OPERATING OFFICER

Mr. Keith Ainsworth, Chairman of RADARSAT International (RSI), is pleased to announce the appointment of Mr. Roland Knight as Chief Operating Officer, effective September 15, 1998. Mr. Knight will report to the Chairman.

In his new capacity, Mr. Knight will assume the duties previously held by Mr. Robert E. Tack, President of RSI, who is stepping down September 15, 1998 in accordance with his succession plans submitted to the Board in 1997.

On behalf of the RSI Board Members, Mr. Ainsworth expressed "gratitude to Mr. Tack for his outstanding leadership of RSI. From its inception in 1990 to today, Mr. Tack has been instrumental in RSI being recognized as the premier radar remote sensing data provider worldwide." Mr. Tack will be returning to Washington, DC, to resume his role as President of LionsGate International, an international consulting company he founded but will remain on RSI's Board providing consulting services to RSI Management for the next eighteen months.

Mr. Tack said, "Having worked very closely with Roland Knight over the past four years, I am very confident that he will take RSI to higher levels."

Established in 1989, RSI is a world leader in providing information solutions from space. RSI's leadership and expertise in radar-based remote sensing earned it the 1998 Canadian-American Business Achievement Award. RSI distributes RADARSAT products worldwide, ERS products in North America, and SPOT, LANDSAT and JERS products in Canada. RSI has a staff of almost 90 and has its headquarters in Richmond (British Columbia, Canada) and offices in Ottawa (Ontario, Canada), Gatineau (Québec, Canada), and Farnborough (United Kingdom).

Ocean drifters bring science to the classroom Thursday, July 23, 1998

In a modern version of putting a message in a bottle and throwing it into the sea, a consortium of federal agencies has deployed more than 200 ocean "drifters" and are waiting to see where they go and what they see.

Has it been a while since you've heard the sound of waves lapping the shore? The National Oceanographic Partnership Program (NOPP) is celebrating the International Year of the Ocean by putting together a program called Project YOTO Drifters, which will bring not only the sounds of the ocean but also real-time ocean science data into classrooms this fall.

More than 200 satellite-tracked drifters are being deployed into the Caribbean Sea/Gulf of Mexico and tropical Atlantic. Several drifters will also be released into a few areas of special interest, such as the iceberg drift region of the North Atlantic. The drifters each have a satellite transmitter for tracking and a sensor to measure sea-surface temperature. Several of the drifters will also be able to estimate ocean color and wind strength. All of the information -- processed data, drifter positions, tracks, reference images and background information -- is available on a specially designed website, http:\\drifters.doe.gov, which is up and running, but still under construction.

Somewhat surprisingly, the drifters are not all going in the direction the scientists expected. Some of the drifters are moving north or east when scientists expected a more westerly path. Other drifters appear to be following the larger current system of the region and are now heading for the Yucatan Straits. Scientists are keeping track to see if and when they enter the Gulf of Mexico.

Ocean currents play an extremely important role in the global transfer of water, heat, organisms, nutrients, potential pollutants and sediments. One of the earliest attempts to study ocean currents took place in 1872 when scientists aboard the R.M.S. Challenger used a float designed specifically to drift passively with the flow of water. Of course, to track the float, they had to follow it; today the work is done by computers and satellites in real time.

Scientists will be able to use drifter data to build models of climate and weather patterns, such as El Niño or hurricanes. Data can also be used to predict where pollutants, such as oil or sewage, would go if dumped or accidentally spilled into the ocean. In addition, many organisms in the ocean drift along with ocean currents, especially the larvae or young of many marine species. Studies on the world's fisheries use drifter tracks to understand where organisms, such as the spiny lobsters in Florida, originate, and how they live. Drifters are also used to track the potential movement of icebergs.

As a final payoff, teachers at almost any level should be able to use the data through the web site The site has an ocean curriculum, associated educational activities and a poster-size tracking chart for the classroom that can be ordered. The GLOBE program is aiding in data visualization to ensure that the scientific data will be readily accessible to the education community. Students and educators can plot the drifter tracks, try to predict their next position and learn along with scientists as they study topics such as ocean currents, the transport of sediment, larvae or pollutants and climate.

NOPP is a partnership of 12 US federal agencies whose mission is to promote national goals in oceanographic research and education.

For further information contact Dr. Ellen Prager, NOPP, (202) 232-3900 ext. 264, eprager@brook.edu.

Reminder to Members

An opportunity now exists for members or non-members to nominate Fellows to the Society, keeping in mind that nominees must be members in good standing. In considering the nominations of Fellows , consideration should be given to the following general criteria:

> Research, Teaching, Technology, Professional Services, Administration in academia, industry, government or other institutions, Communication and interpretation of atmospheric and oceanographic phenomena, Weathercasting International meteorological and/or other oceanographic affairs.

Each nomination should be signed by the primary sponsor and supported by two others, at least one of whom must be from an establishment other than that of the nominee.

Application forms are available from the Office of the Executive Director. Nominations are to be postmarked no later than **April 15, 1999.** The insert in *CMOS Bulletin SCMO* (Vol.26, No.1, p.25) refers.

Rappel aux membres

Les nominations pour les Fellows de la Société sont maintenant acceptées. Les personnes mises en cadidature doivent être des membres en règle de la Société. Les critères suivants devraient être pris en considération lorsqu'une candidature est soumise:

> Recherche, enseignement, technologie, services professionnels, administration dans les universités, l'industrie, le gouvernement et dans les autres institutions, communication et interprétation des phénomènes atmosphériques et océaniques, la prédiction de la météo, les affaires internationales en météorologie et/ou océanographie, autres.

Chaque candidature doit être signée par le commanditaire principal et doit être endossée par deux autres, dont au moins une personne venant d'un établissement autre que celle de la personne mise en nomination.

Les formulaires d'application sont disponibles au bureau du directeur exécutif. La date butoir du **15 avril 1999** devra être respectée. Vous trouverez plus de détails dans le numéro de février du *CMOS Bulletin SCMO* (Vol.26, No.1, p.25).

Neil J. Campbell,
Executive Director

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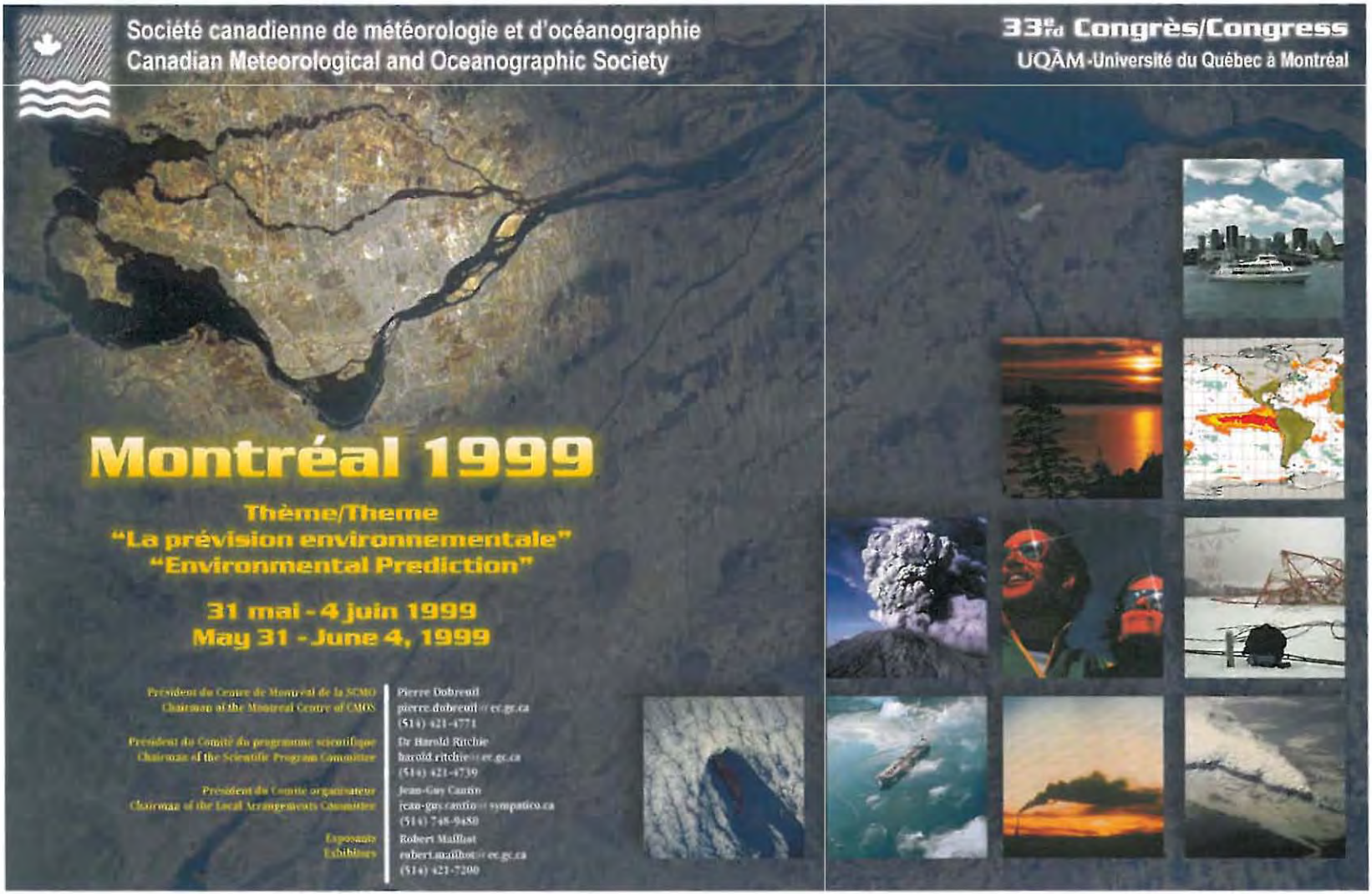

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