

ATMOSPHERE-OCEAN

**16th ANNUAL CONGRESS
26-28 May 1982
University of Ottawa**

**16^e CONGRÈS ANNUEL
26-28 mai 1982
Université d'Ottawa**

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

ATMOSPHERE-OCEAN

Contents

	Page
Summary of Sessions	2
<i>Résumé des sessions</i>	4
Programme	5
Abstracts	19
Agenda for 16th Annual General Meeting	64
<i>Ordre du jour, seizième assemblée générale annuelle</i>	65
Minutes of AGM, 27 May 1981	66
<i>Procès-verbal de l'AGA, le 27 mai 1981</i>	71
President's Report	76
<i>Rapport du président</i>	80
Treasurer's Report	85
<i>Rapport du trésorier</i>	86
Budget	90
Editorial Committee Report	92
<i>Rapport du Comité de rédaction</i>	93
CMOS Newsletter Report	93
Bulletin de nouvelles de la SCMO	93
Report of the Scientific Committee	94
<i>Rapport du Comité scientifique</i>	95
Report of the Standing Committee on Public Information	96
<i>Rapport du Comité permanent d'information publique</i>	96
Report of the Membership Committee	97
<i>Rapport du Comité d'éligibilité des membres</i>	97
Report of the Committee on Professionalism	98
<i>Rapport du Comité sur le professionnalisme</i>	98
Report of the Awards Committee	99
<i>Rapport du Comité des récompenses</i>	99
Report of the Education Committee for Meteorology	99
<i>Rapport du Comité de l'éducation en météorologie</i>	100
Report of the Archivist	100
<i>Rapport de l'archiviste</i>	100
Reports from Local Centres and Chapters	101
Reports from Special Interest Groups	117
Report of the Nominating Committee	119
<i>Rapport du Comité de mise en candidature</i>	119
Lists of Society Awards, Tour Speakers, Corporate Members and Presidents	120
Energex '82	123

ATMOSPHERE-OCEAN
16th Annual Congress Issue

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E.J. Truhlar

Technical Editor/Rédaction technique –
I. Savdie

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Canadian Meteorological and Oceanographic Society
La Société canadienne de météorologie et d'océanographie

The Canadian Meteorological and Oceanographic Society assumed its present constitution in 1977. The organization was first established in 1940 as the Canadian Branch of the Royal Meteorological Society, later becoming the Canadian Meteorological Society in 1967. The Society exists for the advancement of Meteorology and Oceanography (including Limnology) and membership is open to persons and organizations sharing these interests. There are twelve Local Centres and one Chapter of the Society which hold meetings of interest to the membership. *ATMOSPHERE-OCEAN* is the scientific journal published quarterly by the Society and is distributed free to all members except Associate Members. Each spring the Society convenes a National Congress.

There are four types of membership – Member, Student Member, Corporate Member and Associate Member. For 1982 the dues are \$30.00, \$10.00, \$75.00 (min.), and \$15.00, respectively. The annual Institutional subscription rate for *ATMOSPHERE-OCEAN* is \$50.00. Cheques should be made payable to the Canadian Meteorological and Oceanographic Society.

Correspondence regarding Society affairs, membership, Institutional subscriptions and back issues of the journal should be directed to the Corresponding Secretary, Canadian Meteorological and Oceanographic Society, Suite 805, 151 Slater Street, Ottawa, ONT. K1P 5H3. Telephone: (613)-237-3392.

La Société canadienne de météorologie et d'océanographie a adopté la présente constitution en 1977. La Division canadienne de la Société royale de météorologie a été fondée en 1940 et remplacée par la Société météorologique du Canada en 1967. Cette société existe pour le progrès de la météorologie et de l'océanographie (y compris la limnologie) et accueille comme membres toute personne ou organisation intéressée à ces sciences. Les douze centres locaux et une section de la Société réunissent les membres pour des discussions et conférences. *ATMOSPHERE-OCEAN*, la revue scientifique de la Société publiée trimestriellement, est distribuée gratuitement à tous les membres sauf aux Membres associés. La Société organise chaque printemps un Congrès national.

Il y a quatre types de membres: Membre, Membre étudiant, Membre moral et Membre associé. Les cotisations pour 1982 sont de \$30.00, \$10.00, \$75.00 (min.) et \$15.00. Les institutions peuvent souscrire à *ATMOSPHERE-OCEAN* au coût de \$50.00 par année. Les chèques doivent être faits à l'ordre de la Société canadienne de météorologie et d'océanographie.

La correspondance concernant les activités de la Société, les souscriptions des membres et des institutions et les numéros déjà parus, devrait être adressée au Secrétaire-correspondant, Société canadienne de météorologie et d'océanographie, Suite n° 805, 151 rue Slater, Ottawa (ONT.) K1P 5H3. Téléphone: (613)-237-3392.

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SIXTEENTH ANNUAL CONGRESS CANADIAN METEOROLOGICAL AND OCEANOGRAPHIC SOCIETY

The Sixteenth Annual Congress and Annual General Meeting of the Canadian Meteorological and Oceanographic Society will be held at the University of Ottawa, at Ottawa, Ontario, May 26-28, 1982. The theme of the meeting is *Sea Ice*. Special sessions on Data Collection Platforms have been organized by the CMOS Hydrology Special Interest Group, the Canadian Advisory Committee on Remote Sensing and the Canadian Remote Sensing Society.

The Congress affords members of the Society the opportunity to attend sessions covering all aspects of meteorology and oceanography. For this year, a special session entitled "Today and Tomorrow" will give members a chance to acquaint themselves with federal government policy makers and their views. The number of contributions, particularly from Sea Ice Experts, has been most gratifying.

The Scientific programme and the local arrangements for this meeting were organized by:

SCIENTIFIC PROGRAMME COMMITTEE

G.A. Isaac, Chairman	R.O. Ramseier
R.G. Ingram	J.D. Reid
L.D. O'Quinn	N.B.A. Trivett

LOCAL ARRANGEMENTS COMMITTEE

L.D. O'Quinn, Chairman	B. Milo, Social
H.A.C. Jones, Facilities	T.F. Mullane, Registration
B.J. O'Donnell, Exhibits	R.L. Jones, Secretary-Treasurer
D. Mudry, Social	

SEIZIÈME CONGRÈS ANNUEL SOCIÉTÉ CANADIENNE DE MÉTÉOROLOGIE ET D'Océanographie

Les seizièmes congrès annuel et réunion générale annuelle de la Société de météorologie et d'océanographie auront lieu à l'université d'Ottawa, à Ottawa (Ontario) du 26 au 28 mai 1982. Le congrès a pour thème *La glace de mer*. Les sessions spéciales sur les plate-formes de collecte de données ont été organisées par le groupe spécial d'étude de sujets particuliers en hydrologie de la SCMO, par le Comité consultatif canadien de télédétection et par la Société canadienne de télédétection.

Ce congrès offre aux membres de la Société l'opportunité d'assister à des sessions qui englobent tous les aspects de la météorologie et de l'océanographie. Cette année, une session spéciale "Aujourd'hui et demain" permettra aux membres de faire connaissance avec les responsables de politiques fédérales et de se familiariser avec leur manière de voir. Le nombre des communications, spécialement pour experts dans les questions de la glace de mer est satisfaisant.

Le programme scientifique et les arrangements locaux ont été préparés par:

LE COMITÉ DU PROGRAMME SCIENTIFIQUE

G.A. Isaac, Président	R.O. Ramseier
R.G. Ingram	J.D. Reid
L.D. O'Quinn	N.B.A. Trivett

LE COMITÉ DES ARRANGEMENTS LOCAUX

L.D. O'Quinn, Président	D. Mudry et B. Milo, responsables des activités sociales
H.A.C. Jones, responsables des accommodations	T.F. Mullane, inscriptions
B.J. O'Donnell, responsable des expositions	R.L. Jones, Secrétaire-trésorier

SUMMARY OF SESSIONS

Room:
Fauteux Hall
 3rd Floor Walkway

MAY 26-28

Poster Sessions (20)

TUESDAY, MAY 25

Meetings

0800-1700	DCP Workshop	Moot Court
0800-1200	CMOS Professionalism Committee	403
0800-1200	CMOS Public Information Committee	322
0900-1200	CMOS Editorial Committee	315
1300-1700	CMOS Education Committee	316
1300-1700	CMOS Membership Committee	403
1300-1700	CMOS Scientific Committee	321
1400-1700	CMOS Centre Chairmen Committee	322
1800-2300	Registration	Lobby
1800-2000	CMOS Council Meeting	361
1900-2200	Wine and Cheese Icebreaker	3rd Floor

WEDNESDAY, MAY 26

0730-1030	Registration	Lobby
0830-0845	Welcoming Address	Moot Court
0845-0930	Keynote Session	Moot Court
1000-1200	Theme Session: Sea Ice	Moot Court
1300-1500	1A Remote Sensing of Sea Ice	351
1300-1500	1B DCP Networks/Stations	359
1300-1500	1C Large-Scale Circulation	361
1530-1715	2A Regional Sea-Ice Conditions	351
1530-1715	2B DCP Sensors	359
1530-1715	2C Boundary-Layer and Mesoscale Modelling	361
1900-2200	Annual General Meeting of CMOS	Moot Court

THURSDAY, MAY 27

0800-1000	Registration	Lobby
0800-1200	CACRS Meeting	315
0800-0945	Special Session - Today and Tomorrow	Moot Court
1015-1200	3A Sea-Ice Modelling	351
1015-1200	3B Weather Forecasting	359
1015-1200	3C Biometeorology	361
1300-1445	4A Icebergs	351
1300-1445	4B LRTAP Models	359
1300-1445	4C Numerical Weather Prediction	361
1445-1600	Posters and Commercial Exhibits	3rd Floor
1600-1715	5A Circulation - Estuaries, Coastal Areas and Lakes	359
1600-1745	5B Cloud Physics	351
1600-1715	5C Ice Engineering	361
1830-1930	Cocktails - Cash Bar	Cafeteria*
1930-	CMOS Awards Banquet	Cafeteria*

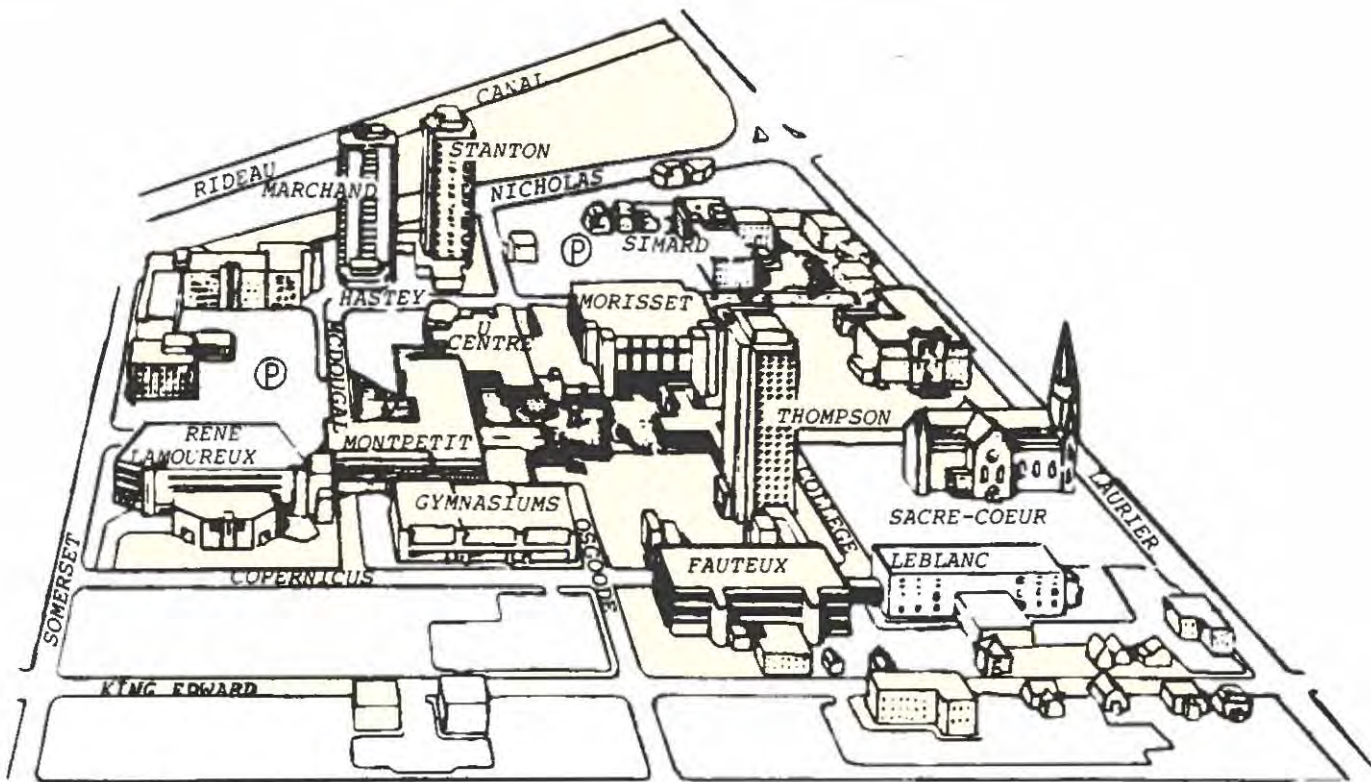
FRIDAY, MAY 28

0830-0945	6A Oceanic Mixing and Water Mass Modification	359
0830-0945	6B Air Quality	351
1015-1100	7A Low-Frequency Waves	361
1100-1200	7B Oceanic Modelling	361
1015-1130	7C Boundary-Layer Meteorology	359
1015-1200	7D Climate	351

Tour

0945-1045	Governor General's Residence
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*University Centre



UNIVERSITY OF OTTAWA
PARTIAL MAP OF CAMPUS

RÉSUMÉ DES SESSIONS

Salle:
Fauteux Hall
 corridor du 3^e étage

MAI 26-28

MARDI LE 25 MAI

Réunions

0800-1700	Affichage (20)	
	Groupe d'étude sur les plate-formes de collecte de données	Moot Court
0800-1200	Comité de la SCMO sur le professionnalisme	403
0800-1200	Comité permanent d'information publique de la SCMO	322
0900-1200	Comité de rédaction de la SCMO	315
1300-1700	Comité de l'éducation de la SCMO	316
1300-1700	Comité d'éligibilité des membres de la SCMO	403
1300-1700	Comité scientifique de la SCMO	321
1400-1700	Comité des présidents des centres de la SCMO	322
1800-2300	Inscription	Entrée
1800-2000	Conseil de la SCMO	361
1900-2200	Vins et fromage pour briser la glace	3 ^e étage

MERCREDI LE 26 MAI

0730-1030	Inscription	Entrée
0830-0845	Ouverture du congrès	Moot Court
0845-0930	Entrée en matière	Moot Court
1000-1200	Présentation thématique: La glace de mer	Moot Court
1300-1500	1A Télédétection de la glace de mer	351
1300-1500	1B Réseaux et stations de plate-formes de collecte de données	359
1300-1500	1C Circulation à grande échelle	361
1530-1715	2A État de la glace de mer régionale	351
1530-1715	2B Détecteurs de plate-formes de collecte de données	359
1530-1715	2C Modélisation de la couche limite et à moyenne échelle	361
1900-2200	Assemblée annuelle générale de la SCMO	Moot Court

JEUDI LE 27 MAI

0800-1000	Inscription	Entrée
0800-1200	Réunion du CACRS	315
0800-0945	Session spéciale: Aujourd'hui et demain	Moot Court
1015-1200	3A Modélisation de la glace de mer	351
1015-1200	3B Prévion du temps	359
1015-1200	3C La biométéorologie	361
1300-1445	4A Icebergs	351
1300-1445	4B Modèles du TGDPA	359
1300-1445	4C Prévion numérique du temps	361
1445-1600	Affichage et exposition commerciale	3 ^e étage
1600-1715	5A La circulation en estuaires, en régions littorales et en lacs	359
1600-1745	5B Physique des nuages	351
1600-1715	5C L'ingénierie et la glace	361
1830-1930	Cocktails	Cafétéria*
1930-	Banquet - récompenses de la SCMO	Cafétéria*

VENDREDI LE 28 MAI

0830-0945	6A Mélange avec l'océan et modification de la masse d'eau	359
0830-0945	6B Qualité de l'air	351
1015-1100	7A Vagues de fréquences basses	361
1100-1200	7B Modélisation de l'océan	361
1015-1130	7C Météorologie de la couche limite	359
1015-1200	7D Le climat	351

Visite

0945-1045	Résidence du Gouverneur Général
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*University Centre

PROGRAMME

Wednesday Morning, May 26, 1982

Welcoming Address

Wed. 0830-0845

Chairman:

G.M. Shimizu

Moot Court

KEYNOTE SESSION

Wed. 0845-0930

Chairman:

E.P. Lozowski

Moot Court

SEA-ICE PROBLEMS AND RESEARCH NEEDS

G.N. Ewing, Ocean Science and Surveys
Ottawa, Ont. K1A 0E6

Coffee (0930-1000)

THEME SESSION

Sea Ice

Wed. 1000-1200

Chairman:

G.A. Isaac

Moot Court

THE ROLE OF SEA ICE IN THE GLOBAL CLIMATE SYSTEM: THEORIES AND EVIDENCE

J. E. Walsh, Department of Atmospheric Sciences, University of Illinois, Urbana, Illinois 61801

SEA ICE IN THE ARCTIC

Kenneth Hunkins, Lamont-Doherty Observatory, Columbia University, Palisades, New York 10964

ICE DETECTION - ICE WARNING

J.B. Mercer, Dome Petroleum, Calgary, Alta T2P 2H8

ICEBERGS

G.R. Peters, Ocean Engineering Group, Memorial University of Newfoundland, St John's, Nfld, A1B 3X5

Lunch (1200-1300)

Wednesday Afternoon, May 26, 1982

SESSION 1A

Remote Sensing of Sea Ice

Wed. 1300-1500

Chairman:

R. O. Ramseier

Room 351

MICROWAVE EMISSIONS FROM SEA ICE: SATELLITE MONITORING YIELDS NEW USER MAP PRODUCTS AND FORECASTING APPLICATIONS

Frank E. Bunn and Frank W. Thirkettle, Ph.D. Associates, Rexdale, Ont. M9W 2T6

René Ramseier, Atmospheric Environment Service, Ottawa, Ont. K1A 0H3

MAPPING AND DISPLAY TECHNIQUES USED FOR COMPUTER AUTOMATED SATELLITE IMAGERY SEA-ICE MAPPING PRODUCTS

Frank W. Thirkettle and Frank E. Bunn, Ph.D. Associates, Rexdale, Ont. M9W 2T6

THE PROCESSING OF MARINE RADAR DATA FOR THE ENHANCEMENT OF SEA ICE IN THE PRESENCE OF SEA CLUTTER

G.L. Austin and M. Riley, Weather Radar Observatory, McGill University, Montréal (Québec)

RADAR BACKSCATTER FROM SEA ICE IN THE FALL

R.G. Onstoft, R.K. Moore, Y.S. Kim, S. Gogineni and D. Bushnell, Remote Sensing Laboratory, University of Kansas, Center for Research Inc., Lawrence, Kansas 66045

R.O. Ramseier, Atmospheric Environment Service, Ottawa, Ont. K1A 0H3

X, C AND L BAND SYNTHETIC APERTURE RADAR (SAR) IMAGERY OF SEA ICE OBTAINED IN THE BEAUFORT SEA DURING OCTOBER AND NOVEMBER 1981

A.L. Gray, C.E. Livingstone, R.K. Hawkins and L.D. Arsenault, Canada Centre for Remote Sensing, Ottawa, Ont. K1A 0Y7

AN ANALYSIS OF RADAR SIGNATURE CHARACTERISTICS OF SEA ICE

Martin F. Price, F.G. Bercha and Associates Ltd, Calgary, Alta T2R 0E2

QUANTITATIVE RIDGE HEIGHT ESTIMATES FROM SAR

D.R. Inkster and R.T. Lowry, INTERA Environmental Consultants Ltd, Ottawa, Ont. K1S 5H4

SESSION 1B

DCP Networks/Stations

Wed. 1300-1500

Chairman:

D.G. Schaefer

Room 359

ROLE OF SATELLITE REAL-TIME DATA IN WATER PROJECT MANAGEMENT

Thomas N. Keefer and Raul S. McQuivey, Sutron Corporation, Fairfax, Virginia 22030

METEOR COMMUNICATIONS - CURRENT APPLICATIONS

John F. Kerns, John B. Jolly Inc., Seattle, Washington 98136

SNOTEL - A STATUS REPORT

Manes Barton, Donald Woodward and Robert Rallison, Soil Conservation Service, U.S. Department of Agriculture, Broomall, Pennsylvania 19009

READAC - THE ATMOSPHERIC ENVIRONMENT SERVICE'S NEXT GENERATION AUTOMATIC WEATHER STATION

D. Dockendorff, Network Planning and Standards Division, Atmospheric Environment Service, Downsview, Ont. M3H 5T4

ALBERTA ENVIRONMENT DCP HYDROLOGY NETWORK

D. Graham, Alberta Environment, Edmonton, Alta

R. Grauman, Wellsdale Research Ltd, Edmonton, Alta T5A 1J8

LAND BASED AUTOMATIC WEATHER STATION

W.C. Thompson, Petro-Canada, Calgary, Alta T2P 2M7

"RÉSEAU DE TÉLÉMÉTRIE PAR SATELLITE": ACQUISITION EN TEMPS RÉEL DES DONNÉES HYDROMÉTÉOROLOGIQUES AU QUÉBEC

Claude Pesant, Ministère de l'environnement du Québec, Québec (Québec) G1Y 4H2

- SESSION 1C** *Large-Scale Circulation* Wed. 1300-1500
Chairman: J. Derome Room 361
- THE BAFFIN ISLAND PARADOX**
 John L. Knox, Department of Geography, University of British Columbia, Vancouver, B.C. V6T 1W5
- THE EFFECTS OF LATITUDINAL ASYMMETRIES ON BAROCLINIC INSTABILITY**
 Charles A. Lin, Department of Physics, University of Toronto, Toronto, Ont. M5S 1A7
- ASPECTS OF THE STRATOSPHERIC CIRCULATION REVEALED BY NMC UPPER ATMOSPHERE ANALYSES**
 Kevin Hamilton, National Center for Atmospheric Research, Boulder, Colorado 80307
- SOME FEATURES OF SIMPLE MODELS OF THE STRATOSPHERIC QUASI-BIENNIAL OSCILLATION**
 Kevin Hamilton, National Center for Atmospheric Research, Boulder, Colorado 80307
- EQUATIONS IN PRESSURE COORDINATES FOR THE "NON-FLAT" EARTH**
 G.J. Boer, Numerical Modelling Division, Atmospheric Environment Service, Downsview, Ont. M3H 5T4
- A SYNOPTIC STUDY OF THE CANADIAN GENERAL CIRCULATION MODEL**
 Steven Lambert, Numerical Modelling Division, Atmospheric Environment Service, Downsview, Ont. M3H 5T4
- SOME PRELIMINARY RESULTS ON THE EFFECTS OF A GRAVITY WAVE DRAG PARAMETERIZATION ON SIMULATIONS OF THE ATMOSPHERIC CIRCULATION**
 N.A. McFarlane, Numerical Modelling Division, Atmospheric Environment Service, Downsview, Ont. M3H 5T4
- JANUARY AND JULY SIMULATIONS BY A TWO-LEVEL SPECTRAL GCM WITH MINTZ-ARAKAWA PHYSICS**
 Neil Sargent, Numerical Modelling Division, Atmospheric Environment Service, Downsview, Ont. M3H 5T4
- Coffee (1500-1530)

- SESSION 2A** *Regional Sea-Ice Conditions* Wed 1530-1715
Chairman: M.W. Smith Room 351
- THE SPACING OF ICE BANDS AHEAD OF A WIND-BLOWN ICE FIELD**
 P.H. LeBlond, Department of Oceanography, University of British Columbia, Vancouver, B.C. V6T 1W5
- A NORTHERN LABRADOR POLYNYA**
 John P. Newell, NORDCO Ltd, St John's Nfld, A1B 3T2
- HISTORICAL ICE COVER ANALYSIS OF NORTHWESTERN BAFFIN BAY**
 John D. Miller, Offshore Engineering, Petro-Canada Exploration Inc., Calgary, Alta T2P 3E3
- EARLY WINTER ICE MOTION IN HUDSON BAY**
 W.E. Markham, Atmospheric Environment Service, Downsview, Ont. M3H 5T4
- FLUCTUATIONS IN SEA-ICE CONDITIONS IN THE QUEEN ELIZABETH ISLANDS**
 B. Alt, D.A. Fisher and R.M. Koerner, Glacier Physics Section, Polar Continental Shelf Project, Energy, Mines and Resources Canada, Ottawa, Ont. K1A 0E4

SESSION 2B**DCP Sensors**

Wed. 1530-1715

Chairman:

J.P. Fortin

Room 359

SENSOR REPAIR AND OVERHAUL. AN OVERVIEW OF SELECTED HYDROMETEOROLOGICAL SENSOR PROBLEM AREAS

R. Grauman, Wellsdale Research Ltd, Edmonton, Alta T5A 1J8

THE PROBLEMS ASSOCIATED WITH THE INSTALLATION OF INSTRUMENTS THAT USE SATELLITE DATA COLLECTION PLATFORMS

J. Whiting, Saskatchewan Research Council, Saskatoon, Sask. S7N 0X1

WATER LEVEL ENCODERS: A RELIABLE, COST-EFFECTIVE CANADIAN ALTERNATIVE TO THE MEMOMARK

R. Grauman, Wellsdale Research Ltd, Edmonton, Alta T5A 1J8

SHIPBOARD AUTOMATIC WEATHER STATION (SAWS)

W.C. Thompson, Petro-Canada, Calgary, Alta T2P 2M7

R.C. Atkins, Micrologic Limited

DRIFTING BUOYS

W.C. Thompson and J.R. Buckley, Petro-Canada, Calgary, Alta T2P 2M7

LIGHTNING DETECTION, DCP'S AND A COST-EFFECTIVE SENSOR

R. Grauman, Wellsdale Research Ltd, Edmonton, Alta T5A 1J8

L. Byerley, Lightning Location and Protection Limited, Tucson, Arizona 85719

LE PROJET BOA II

M. Gagnon, IRNS-Océanologie, Université du Québec à Rimouski, Rimouski (Québec) G5L 3A1

R. Noel et C. Marche, École Polytechnique de Montréal, Campus de l'Université de Montréal, Montréal (Québec) H3C 3A7

SESSION 2C**Boundary-Layer and Mesoscale Modelling**

Wed. 1530-1715

Chairman:

Y. Delage

Room 361

PASSIVE SCALAR CONVECTION BY A PRESCRIBED RANDOM VELOCITY FIELD

William Perrie, National Center for Atmospheric Research, Boulder, Colorado 80307

A THREE-DIMENSIONAL SECOND-ORDER CLOSURE MODEL FOR THE STUDY OF THE PLANETARY BOUNDARY LAYER

Sandor Csanady, Forecast Research Division, Atmospheric Environment Service, Downsview, Ont. M3H 5T4

BAROTROPIC INSTABILITY IN A GRAVITATIONALLY UNSTABLE ENVIRONMENT

G.W. Kent Moore, Geophysical Fluid Dynamics Program, Princeton University, Princeton, New Jersey 08540

BOUNDARY-LAYER FLOW OVER LOW HILLS: COMPARISON OF MODEL RESULTS AND WIND-TUNNEL DATA

John L. Walmsley, Atmospheric Environment Service, Downsview, Ont. M3H 5T4

MODELLING AND VALIDATION OF THE DAYTIME MIXED LAYER DEPTH AT TWO COASTAL SITES

D.G. Steyn and T.R. Oke, Department of Geography, University of British Columbia, Vancouver, B.C. V6T 1W5

Annual General Meeting of CMOS

Wed. 1900-2200

Moot Court

Thursday Morning, May 27, 1982

SPECIAL SESSION *Today and Tomorrow*

Thurs. 0800-0945

Chairman: R. Asselin

Moot Court

METEOROLOGY IN CANADA

J.P. Bruce, Atmospheric Environment Service
Ottawa, Ont. K1A 0H3

OCEANOGRAPHY IN CANADA

G.N. Ewing, Ocean Science and Surveys
Ottawa, Ont. K1A 0E6

NSERC - METEOROLOGY AND OCEANOGRAPHY

Gilles Julien, Natural Sciences and Engineering Research Council
Ottawa, Ont. K1A 0R6

Coffee (0945-1015)

SESSION 3A *Sea-Ice Modelling*

Thurs. 1015-1200

Chairman: I. Rutherford

Room 351

THE ATMOSPHERIC ENVIRONMENT SERVICE REGIONAL ICE MODEL (RIM) FOR OPERATIONAL APPLICATIONS

V.R. Neralla, R.G. Jessup, S. Venkatesh and E.C. Jarvis, Atmospheric Environment Service, Downsview, Ont. M3H 5T4

NUMERICAL ICE PREDICTION AT ICE FORECASTING CENTRAL

J.C. Falkingham, Ice Forecasting Central, Atmospheric Environment Service, Ottawa, Ont. K1A 0H3

AN INTEGRATED ICE DYNAMICS MODEL FOR THE CANADIAN ARCTIC

E. Leavitt, T. Wong and E. Krakowski, INTERA Environmental Consultants Ltd, Calgary, Alta T2H 1X9

AN OPERATIONAL ICE PACK PREDICTION MODEL AND SYSTEM

R. Sinclair and J. Clodman, Meteorological and Environmental Planning Ltd, Downsview, Ont. M3J 2C4

RECENT RESULTS FROM THE LABRADOR SEA-ICE MODEL

J.S. Foley, Newfoundland Institute of Cold Ocean Science
T.E. Keliher, Physics Department, Memorial University, St John's, Nfld A1B 3X7

A ONE-DIMENSIONAL MODEL OF SEA-ICE THERMODYNAMICS

R. Gabison and B. DeLorenzis, Atmospheric Environment Service, Downsview, Ont. M3H 5T4

SESSION 3B *Weather Forecasting*

Thurs. 1015-1200

Chairman: P.J. Pender

Room 359

AUTOMATED FORECASTS OF MAXIMUM AND MINIMUM TEMPERATURES FOR CANADIAN STATIONS

N. Brunet, R. Robinson and N. Yacowar, Canadian Meteorological Centre, Atmospheric Environment Service, Dorval (Québec) H9P 1J3

AUTOMATED PREDICTION OF SURFACE WIND USING THE PERFECT PROG TECHNIQUE

A. Maarouf, Forecast Research Div., Atmospheric Environment Service, Downsview, Ont. M3H 5T4

MOS FORECASTS OF SURFACE WIND SPEED AND DIRECTION AT CANADIAN STATIONS

W.R. Burrows, Meteorological Services Research Branch, Atmospheric Environment Service, Downsview, Ont. M3H 5T4

POSITION AND CENTRAL PRESSURE ERRORS OF LOW PRESSURE CENTRES ON MANUAL AND MACHINE PROGS

I.B. Findleton, Canadian Meteorological Centre, Atmospheric Environment Service, Dorval (Québec)
H9P 1J3

AUTUMN CYCLONIC STORMS OVER SOUTHERN ONTARIO

T.B. Low and B.D. Kalanda, Environmental Applications Group Ltd, Toronto, Ont. M5R 2H4
R.E. Stewart, Cloud Physics Research Division, Atmospheric Environment Service, Downsview,
Ont. M3H 5T4

ON THE ECONOMIC VALUE OF TWO DECADES OF WINTER-TIME TEMPERATURE FORECASTS FOR TORONTO

A. Stuart, INTERA Environmental Consultants Ltd, Calgary, Alta T2H 1X9

NON-METEOROLOGICAL FACTORS IN THE PUBLIC FORECAST PROCESS

D.W. Layton, Maritimes Weather Office, Atmospheric Environment Service, Bedford, N.S. B4A 1E5

SESSION 3C

Biometeorology

Thurs. 1015-1200

Chairman:

R.H. Douglas

Room 361

BOWEN RATIO DETERMINATIONS OF SURFACE RESISTANCE IN WETLAND EVAPORATION

D.S. Munro, Department of Geography, University of Toronto, Toronto, Ont. M5S 1A1

SURFACE CONTROL OF AGRICULTURAL CROP AND FOREST EVAPORATION

W.G. Bailey, Land Resource Research Institute, Agriculture Canada, Ottawa, Ont. K1A 0C6

DETERMINATION OF THE EFFECTS OF THE SPOTTED TENTIFORM LEAFMINER ON NET PHOTOSYNTHESIS OF APPLE LEAVES

William J. Blackburn, John T.A. Proctor and Jody M. Bodnar, Department of Horticultural Science,
Ontario Agricultural College, University of Guelph, Guelph, Ont. N1G 2W1

USING DEGREE-DAYS TO PREDICT THE OCCURRENCE OF APPLE SCAB INFECTION

William J. Blackburn, John T.A. Proctor and T.J. Gillespie, Department of Horticultural Science and
Land Resource Science, University of Guelph, Guelph, Ont. N1G 2W1

TRANSFER OF SMALL PARTICLE POLLUTANTS TO PINE FOLIAGE AND LICHENS

Peter H. Schuepp, Department of Agricultural Chemistry and Physics, Macdonald Campus, McGill
University, Ste-Anne-de-Bellevue (Québec) H9X 1C0

SOIL WATER AND FREEZE/THAW PROCESS OBSERVATIONS USING TIME DOMAIN REFLECTOMETRY

H.N. Hayhoe, W.G. Bailey, G.C. Topp and K.D. White, Land Resource Research Institute, Agriculture
Canada, Ottawa, Ont. K1A 0C6

CO₂ FLUX MEASUREMENTS FROM AIRCRAFT - AN UPDATE

P. Alvo, R.L. Desjardins, E.J. Brach and P.H. Schuepp, Department of Agricultural Chemistry and
Physics, Macdonald Campus, McGill University, Ste-Anne-de-Bellevue (Québec) H9X 1C0

Lunch (1200-1300)

Thursday Afternoon, May 27, 1982

SESSION 4A

Icebergs

Thurs. 1300-1445

Chairman:

J. Rossiter

Room 351

THE DETECTION OF ICEBERGS IN A SEA-ICE BACKGROUND USING AES SLAR

D. Lapp, Polar Research and Engineering, Ottawa, Ont. K1R 7T7

A STUDY OF LONG-TERM SATELLITE-TRACKED ICEBERG DRIFT IN BAFFIN BAY AND DAVIS STRAIT

J.R. Marko, J.R. Birch and M. Wilson, Arctic Sciences Limited, Sidney, B.C. V8L 3S1

ICEBERG DISTRIBUTION ALONG THE LABRADOR COAST AS DETERMINED BY SIDE LOOKING AIRBORNE RADAR

H.G. Hengeveld and D. Mudry, Atmospheric Environment Service, Downsview, Ont. M3H 5T4

THE EFFECT OF AVERAGING PERIOD ON ICEBERG VELOCITY

L.M. Wilson, Offshore Engineering, Petro-Canada Exploration Inc., Calgary, Alta T2P 3E3

ESTIMATION OF ICEBERG VOLUME BY AERIAL PHOTOGRAMMETRY

E. Krakowski and E. Leavitt, INTERA Environmental Consultants Ltd, Calgary, Alta T2H 1X9

W. Spring, Mobil Research and Development Corporation, Dallas, Texas

STATISTICAL MODELLING TECHNIQUES FOR ICEBERG MOTION IN WEST BAFFIN BAY

D.S. Davison and R. McKenna, INTERA Environmental Consultants Ltd, Calgary, Alta T2H 1X9

SESSION 4B

LRTAP Models

Thurs. 1300-1445

Chairman:

G. Paulin

Room 359

TRAJECTORIES OF AIR PARCELS REACHING QUÉBEC IN 1978

Gilles Desautels, Atmospheric Environment Service, Ville St-Laurent (Québec) H4M 2N6

EVALUATION OF THE ACCURACY OF TRAJECTORY MODELS FOR LONG-RANGE TRANSPORT OF ATMOSPHERIC POLLUTANTS

John L. Walmsley and Jocelyn Mailhot, Atmospheric Environment Service, Downsview, Ont. M3H 5T4

TRANSFER MATRICES FROM THE AES-LRT MODEL

M.P. Olson, E.C. Voldner and K.K. Oikawa, Air Quality and Inter-Environmental Research Branch, Atmospheric Environment Service, Downsview, Ont. M3H 5T4

SHORT-RANGE DEPOSITION AND LONG-RANGE TRANSPORT OF AIR POLLUTION

John D. Reid, Boundary Layer Research Division, Atmospheric Environment Service, Downsview, Ont. M3H 5T4

AN INVESTIGATION OF THE ASSUMPTIONS OF LINEAR CHEMISTRY AND SUPERPOSITION IN LRTAP MODELS

R.W. Shaw, Environmental Protection Service, Dartmouth, N.S. B2Y 2N6

J.W.S. Young, Atmospheric Environment Service, Downsview, Ont. M3H 5T4

THE FORMATION OF THE AQRB/RPN LRTAP EULERIAN MODELLING PROJECT

David Davies, Division de Recherche en prévision numérique, Service de l'environnement atmosphérique, Dorval (Québec) H9P 1J3

SESSION 4C

Numerical Weather Prediction

Thurs. 1300-1445

Chairman:

P.E. Merilees

Room 361

UNE DISCRÉTISATION VERTICALE CONSERVATIVE PAR ÉLÉMENTS FINIS DANS LE MODÈLE SPECTRAL DU CMC

Claude Girard, Recherche en prévision numérique, Service de l'environnement atmosphérique, Dorval (Québec) H9P 1J3

LES ÉCHANGES AVEC LE SOL DANS LE MODÈLE SPECTRAL

Yves Delage, Recherche en prévision numérique, Service de l'environnement atmosphérique, Dorval (Québec) H9P 1J3

PARAMÉTRISATION DES NUAGES DANS UN MODÈLE DE PRÉVISION

Louis Garand, Recherche en prévision numérique, Service de l'environnement atmosphérique, Dorval (Québec) H9P 1J3

LES ERREURS SYSTÉMATIQUES DES PRÉVISIONS NUMÉRIQUES DU CENTRE MÉTÉOROLOGIQUE CANADIEN (CMC)

Clément Chouinard, Recherche en prévision numérique, Service de l'environnement atmosphérique, Dorval (Québec) H9P 1J3

RECENT DEVELOPMENTS IN OBJECTIVE ANALYSIS AT THE CANADIAN METEOROLOGICAL CENTRE

Donald Shantz, Recherche en prévision numérique, Service de l'environnement atmosphérique, Dorval (Québec) H9P 1J3

IMPACT STUDY OF DIRECT ASSIMILATION OF RADIANCE DATA FROM SATELLITES ON THE ANALYSIS OF THE ATMOSPHERE

Evhen Yakimiw, Recherche en prévision numérique, Service de l'environnement atmosphérique, Dorval (Québec) H9P 1J3

THE DYNAMICAL EQUATIONS IN TURBULENT FLOW

Douglas M. Leahey, Western Research and Development, Calgary, Alta T2E 6L5

POSTER SESSION

Thurs. 1445 - 1600
3rd Floor

Poster 1

GULF OF ST LAWRENCE SEA-ICE ANALYSIS USING NIMBUS-7 SMMR DATA

Anne E. Owens, Frank E. Bunn and Frank W. Thirkettle, Ph.D. Associates Inc., Rexdale, Ontario M9W 2T6

René O. Ramseier, Atmospheric Environment Service, Ottawa, Ont. K1A 0H3

Poster 2

ANALYSIS OF MULTI-STAGE MULTI-DATE IMAGERY OF SEA ICE IN VISCOUNT MELVILLE SOUND N.W.T.

Alan R. Sneyd, Fenco Consultants Ltd, Calgary, Alberta T3C 0H9

Bharat Dixit, Arctic Pilot Project, Calgary, Alta T2P 3C5

Poster 3

IN SITU DETERMINATION OF THE THERMAL PROPERTIES OF SEA ICE

Humfrey Melling, Frozen Sea Research Group, Institute of Ocean Sciences, Sidney, B.C. V8L 4B2

Poster 4

VARIABILITY OF ICE FLOE MOTION IN LANCASTER SOUND AND WESTERN BAFFIN BAY

D.M. Nazarenko and D.E. Pearson, Offshore Engineering, Petro-Canada Exploration Inc., Calgary, Alta T2P 3E3

Poster 5

SUMMER DISTRIBUTION OF ICEBERGS AND SEA ICE IN NORTHWESTERN BAFFIN BAY AND LANCASTER SOUND

D.E. Pearson, Offshore Engineering, Petro-Canada Exploration Inc., Calgary, Alta T2P 3E3

Poster 6

ALBEDO SURVEY AND SIMULATION FOR ANDREI GLACIER, B.C., MID-SUMMER, 1980

S. Fogarasi, Surface Water Division, National Hydrology Research Institute, Ottawa, Ont. K1A 0E7

Poster 7

FORECAST SUPPORT TO OIL EXPLORATION IN THE SOUTHERN BEAUFORT SEA

E.T. Hudson and W.D. Hume, Satellite and Beaufort Office, Atmospheric Environment Service, Edmonton, Alta

Poster 8

SURFACE SHEAR STRESS AND SURFACE CURRENTS ON LOWER BASS LAKE

Ellsworth F. LeDrew and Peter D. Reid, Department of Geography, University of Waterloo, Waterloo, Ont. N2L 3G1

Poster 9

THE TOPOGRAPHIC INFLUENCE OF THE LIUPAN MOUNTAIN RANGE ON THE HAIL PROCESS IN THE PINGLIANG DISTRICT OF CHINA

Qu Zhang and others, Lanzhou Institute of Plateau Atmospheric Physics, Academia Sinica, Lanzhou, Gansu, China

Poster 10

A REVIEW OF CANADIAN INVOLVEMENT IN HIPLEX AND CCOPE AND APPLICATIONS OF THESE PROJECTS TO WEATHER MODIFICATION IN CANADA

Robert S. Schemenauer, Cloud Physics Research Division, Atmospheric Environment Service, Downsview, Ont. M3H 5T4

J.I. MacPherson, Flight Research Laboratory, National Aeronautical Establishment, Ottawa, Ont. K1A 0R6

Poster 11

THE NAE TWIN OTTER ATMOSPHERIC RESEARCH AIRCRAFT

J.I. MacPherson, J.M. Morgan and K. Lum, Flight Research Laboratory, National Aeronautical Establishment, National Research Council, Ottawa, Ont. K1A 0R6

Poster 12

THE DEVELOPMENT OF THE ALBERTA RESEARCH AIRCRAFT FACILITY

K.L. Grandia, D.S. Davison and R. Rudolph, INTERA Environmental Consultants Ltd, Calgary, Alta T2H 1X9

Poster 13

INFLUENCE OF SNOW COVER ON SOIL TEMPERATURES IN THE BIOLOGICALLY ACTIVE ZONE

H.N. Hayhoe and L.M. Dwyer, Land Resource Research Institute, Agriculture Canada, Ottawa, Ont. K1A 0C6

Poster 14

EVAPOTRANSPIRATION REGIMES IN CANADA

W.G. Bailey, Land Resource Research Institute, Agriculture Canada, Ottawa, Ont. K1A 0C6

Poster 15

POLLINATION ACTIVITY OF THE ALFALFA LEAFCUTTING BEE

H. Lerer, Food Production and Inspection Branch, Agriculture Canada, Ottawa, Ont. K1A 0C5

W.G. Bailey, Land Resource Research Institute, Agriculture Canada, Ottawa, Ont. K1A 0C6

P.F. Mills, Agriculture Canada, Beaverlodge, Alta T0H 0C0

Poster 16

AUTOMATED WEATHER ELEMENT INPUT TO FOREST FIRE SEVERITY FORECASTING

R.L. Raddatz and G.B. Atkinson, Central Region, Atmospheric Environment Service, Winnipeg, Man. R3C 3V4

Poster 17

SOIL MOISTURE STATUS DURING DROUGHT EVENTS: TWO EXAMPLES FROM THE PRAIRIE PROVINCES

R.B. Street and D.W. McNichol, Applications and Impact Division, Atmospheric Environment Service, Downsview, Ont. M3H 5T4

Poster 18

THE EFFECT OF CLIMATIC VARIATION ON TREE RINGS OF SPRUCE FROM THE CENTRAL CANADIAN BOREAL FOREST

L.A. Jozsa, M.L. Parker, P.A. Bramhall and S.G. Johnson, Forintek Canada Corp., Western Laboratory, Vancouver, B.C.

J.M. Powell and N.B. Schultz, Northern Forest Research Centre, Canadian Forestry Service, Edmonton, Alta

Poster 19

CANADIAN CLIMATE INFORMATION - THE ATMOSPHERIC ENVIRONMENT SERVICE

Frank D. Manning, Canadian Climate Centre, Atmospheric Environment Service, Downsview, Ont. M3H 5T4

Poster 20

DROUGHT AND DUST ON THE PRAIRIES: U.S.-CANADIAN COMPARISONS

Steve LaDochy, Department of Geography, University of Winnipeg, Winnipeg, Man. R3B 2E9

Clarence H. Annett, Department of Geography - Meteorology, University of Kansas, Kansas

Poster 21

SUMMER 1979: ICE CLIMATOLOGY OF THE CANADIAN ARCTIC

B. Dey, Department of Geology and Geography, Howard University, Washington, D.C. 20059

Poster 22

APPLICATIONS OF SEASAT SCATTEROMETER DATA FOR WEATHER FORECASTING

S. Peteherych, Atmospheric Environment Service, Downsview, Ont. M3H 5T4

P.M. Woiceshyn, Jet Propulsion Laboratory, Pasadena, California 91109

M.G. Wurtele, G. Cunningham and M. Borowski, University of California at Los Angeles, Los Angeles, California 90024

A. Davies, Downsview, Ontario M3J 1H2

Poster 23

SEASAT SCATTEROMETER MEASUREMENTS OF ARCTIC ICE

S. Peteherych and D. Laurin, Atmospheric Environment Service, Downsview, Ont. M3H 5T4

SESSION 5A

Circulation - Estuaries, Coastal Areas and Lakes

Thurs. 1600-1715

Chairman:

P.H. LeBlond

Room 359

CIRCULATION ON THE NEWFOUNDLAND CONTINENTAL SHELF

B. Petrie, Atlantic Oceanographic Laboratory, Bedford Institute of Oceanography, Dartmouth, N.S. B2Y 4A2

C. Anderson, Marine Sciences Centre, McGill University, Montréal (Québec)

MEAN AND SEASONAL CIRCULATION OFF CAPE SABLE, NOVA SCOTIA

Peter C. Smith, Atlantic Oceanographic Laboratory, Bedford Institute of Oceanography, Dartmouth, N.S. B2Y 4A2

BOTTOM CURRENTS IN THE CENTRAL BASIN OF LAKE ERIE

F.M. Boyce, M.N. Charlton, G.N. Ivey and K.C. Miners, National Water Research Institute, Burlington, Ont. L7R 4A6

RESPONSE OF THE EASTMAIN RIVER ESTUARY (JAMES BAY) TO FLOW REDUCTION

R.G. Ingram, J.C. Deguise and S. Lepage, Institute of Oceanography, McGill University, Montréal (Québec) H3A 2B2

CURRENT MEASUREMENTS IN GEORGIA STRAIT

T. Yao, S. Pond and L. Mysak, Department of Oceanography, University of British Columbia, Vancouver, B.C. V6T 1W5

SESSION 5B*Cloud Physics*

Thurs. 1600-1745

Chairman:

R.S. Schemenauer

Room 351

NEW EVIDENCE FOR RAINFALL ENHANCEMENT IN NORTH DAKOTA

Amos G. Eddy, University of Oklahoma

E.R. Reinelt, Department of Geography, University of Alberta, Edmonton, Alta T6G 2H4

THE REMOTE SENSING OF SUPERCOOLED LIQUID WATER IN CLOUDS USING RADAR DATA

G.L. Austin and O. Massambani, Weather Radar Observatory, McGill University, Montréal (Québec)

PRECIPITATION PROCESSES WITHIN THE ALBERTA HAILSTORM OF 21 JULY 1979

Terrence W. Krauss, Atmospheric Sciences Department, Alberta Research Council, Edmonton, Alta T6H 5R7

THE APPLICATION OF A COMPUTER MODEL FOR THE OPTIMAL PLACEMENT OF CLOUD PHYSICS SENSORS ON A RESEARCH AIRCRAFT

M.M. Oleskiw, K.L. Grandia and D.S. Davison, INTERA Environmental Consultants Limited, Calgary, Alta T2H 1X9

NUMERICAL SIMULATION OF THE MODIFICATION OF A CUMULUS CLOUD

Xu Hua-ying, Huang Mei-yun, Hao Jing-fu and Li Gui-chen, Institute of Atmospheric Physics, Academia Sinica, Beijing, China

THE DISTRIBUTION OF LARGE CLOUD DROPLETS AND INITIATION OF RAIN IN WARM STRATIFORM CLOUDS

Huang Mei-yun, He Zhen-zhen and Shen Zhi-lai, Institute of Atmospheric Physics, Academia Sinica, Beijing, China

FURTHER ANALYSIS OF HAILFALL FROM SUPERCELL HAILSTORMS

Wang Ang-sheng, Xu Nai-zhang and Huang Mei-yun, Institute of Atmospheric Physics, Academia Sinica, Beijing, China

SESSION 5C*Ice Engineering*

Thurs. 1600-1715

Chairman:

R.A. Stacey

Room 361

ICE AND OFFSHORE PRODUCTION ON THE EAST COAST OF CANADA

P.E. Vandall, Jr, Canada Oil and Gas Lands Administration, Energy, Mines and Resources Canada, Ottawa, Ont. K1A 0E4

THE SIMULATION OF SEA-ICE CONCENTRATION FOR ESTIMATING DRILLING DOWN-TIME

I. Stuart Hotzel and John D. Miller, Offshore Engineering, Petro-Canada Exploration Inc., Calgary, Alta T2P 3G2

OPTIMAL PLATFORM STRENGTH IN THE PRESENCE OF MOVING ICE

E.G. Enns, B.R. Smith and P.F. Ehlers, Department of Mathematics and Statistics, University of Calgary, Calgary, Alta T2N 1N4

THE DEVELOPMENT OF CRYSTALLOGRAPHIC PREFERRED ORIENTATIONS IN SEA ICE - A REVIEW AND OUTLINE FOR FURTHER WORK

Ed Stander, Centre for Cold Ocean Resources Engineering, Memorial University of Newfoundland, St John's, Nfld A1B 3X5

Cocktails

Thurs. 1830-1930

Cafeteria

Awards Banquet

1930-

Friday Morning, May 28, 1982

SESSION 6A

Oceanic Mixing and Water Mass Modification

Fri. 0830-0945

Chairman:

R. C. Ingram

Room 359

TURBULENCE STUDIES IN A REGION OF HIGH TIDAL RANGE – SWANSEA BAY, BRISTOL CHANNEL, U.K.

Ian Borthwick, Woodward-Clyde Consultants, St John's Nfld, A1B 2C8

CROSS-FRONT MIXING IN A FRONTAL ZONE IN THE GULF OF ST LAWRENCE

C.L. Tang, Atlantic Oceanographic Laboratory, Bedford Institute of Oceanography, Dartmouth, N.S. B2Y 4A2

MIXING BY INTERNAL TIDES

H. Sandstrom and J.A. Elliott, Atlantic Oceanographic Laboratory, Bedford Institute of Oceanography, Dartmouth, N.S. B2Y 4A2

REGENERATION OF NUTRIENTS IN DEEP BAFFIN BAY

E.P. Jones and A.R. Coote, Chemical Oceanography Division, Bedford Institute of Oceanography, Dartmouth, N.S. B2Y 4A2

D. Dyrssen, Department of Analytical and Marine Chemistry, Chalmers Technical University, Goteborg, Sweden

PHYSICAL ENVIRONMENTAL OBSERVATIONS MADE FROM DRILLING UNITS OFF THE EAST COAST OF CANADA

P.E. Vandall, Jr and W.S. Appleby, Canada Oil and Gas Lands Administration, Energy, Mines and Resources Canada, Ottawa, Ont. K1A 0E4

ON THE ANNUAL MARCH OF THE HEAT BUDGET OF THE NORTH ATLANTIC OCEAN

Peter J. Lamb, Climatology Section, Illinois State Water Survey, Champaign, Illinois 61820

Andrew F. Bunker (deceased), Woods Hole Oceanographic Institution, Woods Hole, Mass. 02543

SESSION 6B

Air Quality

Fri. 0830-0945

Chairman:

R. Angle

Room 351

A SPECULATION ON THE EFFECT OF VOLCANOES ON CLIMATE

W.F.J. Evans, Experimental Studies Division, Atmospheric Environment Service, Downsview, Ont. M3H 5T4

CLOUD AND PRECIPITATION INTERACTION WITH A PLUME OF POLLUTANTS

G.A. Isaac, J.W. Strapp, R. Leitch, J.B. Kerr and H.A. Wiebe, Atmospheric Environment Service, Downsview, Ont. M3H 5T4

AIRCRAFT MEASUREMENTS OF CLOUD AND PRECIPITATION SCAVENGING IN POLLUTED AIR MASSES IN SOUTHERN ONTARIO

J.W. Strapp, H.A. Wiebe, R. Leitch, G.A. Isaac and J.B. Kerr, Atmospheric Environment Service, Downsview, Ont. M3H 5T4

MICROMETEOROLOGY AND DRY DEPOSITION OF PARTICLES

F. Fanaki, M. Ibrahim and L. Barrie, Atmospheric Environment Service, Downsview, Ont. M3H 5T4

PLUME RANDOMIZATION AS A METHOD TO ADDRESS WIND DIRECTION UNCERTAINTY EFFECTS IN DISPERSION MODELS

S.K. Sakiyama, Air Quality Control Branch, Alberta Environment, Edmonton, Alta T5K 2J6

Coffee (0945-1015)

- SESSION 7A** *Low-Frequency Waves* Fri. 1015-1100
Chairman: P. Smith Room 361
- ON THE RELATIONSHIP BETWEEN INTERANNUAL BAROCLINIC WAVES AND FISH POPULATIONS IN THE NORTHEAST PACIFIC**
 Lawrence A. Mysak, William W. Hsieh and Timothy R. Parsons, Department of Oceanography, University of British Columbia, Vancouver, B.C. V6T 1W5
- FREELY PROPAGATING TRENCH WAVES ON A BETA-PLANE**
 Andrew J. Willmott, Department of Oceanography, Naval Postgraduate School, Monterey, California 93940
- SUBINERTIAL FLUCTUATIONS IN THE SOURCE REGION OF THE SOMALI CURRENT**
 Gordon J. Mertz and Lawrence A. Mysak, Department of Oceanography, University of British Columbia, Vancouver, B.C., V6T 1W5
- SESSION 7B** *Oceanic Modelling* Fri. 1100-1200
Chairman: B. Petrie Room 361
- MODELLING THE NON-TIDAL BAROTROPIC CIRCULATION IN THE BAY OF FUNDY AND GULF OF MAINE**
 David A. Greenberg, Atlantic Oceanographic Laboratory, Bedford Institute of Oceanography, Dartmouth, N.S. B2Y 4A2
- LOW-FREQUENCY WAVE MOTION OVER STRONG TOPOGRAPHY**
 Yves Gratton, Department of Oceanography, University of British Columbia, Vancouver, B.C. V6T 1W5
- UPWELLING OFF SOUTHWEST NOVA SCOTIA: OBSERVATIONS AND THREE-DIMENSIONAL MODELLING**
 D. Lefavre, K.-T. Tee and P.C. Smith, Atlantic Oceanographic Laboratory, Bedford Institute of Oceanography, Dartmouth, N.S. B2Y 4A2
- DYNAMICS OF THE FRESH WATER PULSE**
 K.-T. Tee, Atlantic Oceanographic Laboratory, Bedford Institute of Oceanography, Dartmouth, N.S. B2Y 4A2
- SESSION 7C** *Boundary-Layer Meteorology* Fri. 1015-1130
Chairman: P.A. Taylor Room 359
- STRUCTURE FUNCTIONS OVER LAKE ONTARIO**
 Robert Golus and H.A. Panofsky, Department of Meteorology, Pennsylvania State University, University Park, Pennsylvania 16802
 Mark Donelan, National Water Research Institute, Canada Centre for Inland Waters, Burlington, Ont.
- TIME-AVERAGE OF THE NON-LINEAR STRESS LAW**
 Daniel G. Wright, Atlantic Oceanographic Laboratory, Bedford Institute of Oceanography, Dartmouth, N.S. B2Y 4A2
 Keith R. Thompson, Institute of Oceanographic Sciences, Bidston Observatory, Birkenhead, Merseyside, Great Britain
 Richard F. Marsden, Dalhousie University, Halifax, N.S.
- THE SPECTRA OF WIND, TEMPERATURE AND HUMIDITY AT SABLE ISLAND, N.S.**
 R.J. Anderson and S.D. Smith, Atlantic Oceanographic Laboratory, Bedford Institute of Oceanography, Dartmouth, N.S. B2Y 4A2
- FLOW MODIFICATION OVER A LOW HILL**
 R.E. Mickle, P.A. Taylor and J.R. Salmon, Atmospheric Environment Service, Downsview, Ont. M3H 5T4

SOME RESULTS REGARDING BAROCLINICITY DEPENDENCE OF THE UNIVERSAL
FUNCTIONS OF ROSSBY-NUMBER SIMILARITY THEORY

Sandor Csanady, Forecast Research Division, Atmospheric Environment Service, Downsview, Ont.
M3H 5T4

SESSION 7D

Climate

Fri. 1015-1200

Chairman:

S. Orvig

Room 351

POSSIBLE ORIENTATIONS FOR A CANADIAN CARBON DIOXIDE PROGRAMME

R.G. Lawford, Atmospheric Environment Service, Downsview, Ont. M3H 5T4

LIGHTNING HAZARD IN MANITOBA: A CLIMATOLOGICAL LOOK

Steve LaDochy, Department of Geography, University of Winnipeg, Winnipeg, Man. R3B 2E9

SOME ASPECTS OF THE CALIBRATION OF EARLY CANADIAN TEMPERATURE RECORDS - A CASE STUDY FOR EASTERN HUDSON BAY 1814 TO 1821

C. Wilson, Ottawa, Ont. K1K 0R6

THE COMBINED ACTION OF THE ATMOSPHERIC CIRCULATION AND RELIEF ON THE
PRECIPITATION REGIME IN COLOMBIA

I.Noë Dobrea, Hymeteq A.L. Ltd, Downsview, Ont. M3J 2V5

THE CLIMATOLOGY OF TORNADOES IN CANADA FOR THE PERIOD 1950-1979

M.J. Newark, Ontario Weather Centre, Atmospheric Environment Service, Toronto International
Airport, Toronto, Ont.

WEATHER OUTLOOK BY CONTINGENCY ANALYSIS OF 100-50 KPA MEAN MONTHLY
THICKNESS FIELD

L.O. Mapanao, Hydrometeorology Division, Atmospheric Environment Service, Downsview, Ont.
M3H 5T4

ÉTUDE DE LA CIRCULATION GÉNÉRALE DE L'ATMOSPHÈRE PAR LES MÉTHODES DE
LA CLIMATOLOGIE SYNOPTIQUE

J. Litynski et J. Sockenski, Université du Québec à Trois-Rivières, Trois-Rivières (Québec) G9A 5H7

ABSTRACTS

Keynote Session

Wed. 0845-0930

SEA-ICE PROBLEMS AND RESEARCH NEEDS

G.N. Ewing

Sea ice is and always has been one of the greatest impediments to Canadian economic development. Ice renders many of Canada's otherwise navigable waterways completely useless for much of the year. Hudson Bay and the Northwest Passage are the most obvious examples. Farther south, year-round navigation is only made possible by massive icebreaking commitments. Only the southern fringe of the Atlantic Provinces and the West Coast are ice-free. This paper reviews the ice problem in Canadian waters, describes how we have attempted to come to grips with it in the past, and looks at some of the ice-related problems that lie ahead in the context of such developments as the Arctic Pilot Project and frontier offshore oil exploitation. The impact of the 1973 Cabinet Directive on Excellence in Ice-Covered waters is discussed and breakthroughs in ice technology such as the *Canmar Kigoriak* and *M/V Arctic* are highlighted. The paper concludes with a discussion of what sea-ice research should be undertaken to ensure safe industrial development and marine transport in Canada's frozen seas.

Theme Session Sea Ice

Wed. 1000-1200

THE ROLE OF SEA ICE IN THE GLOBAL CLIMATE SYSTEM: THEORIES AND EVIDENCE

J.E. Walsh

SEA ICE IN THE ARCTIC

Kenneth Hunkins

ICE DETECTION - ICE WARNING

J.B. Mercer

ICEBERGS

G.R. Peters

Session 1A Remote Sensing of Sea Ice

Wed. 1300-1500

MICROWAVE EMISSIONS FROM SEA ICE: SATELLITE MONITORING YIELDS NEW USER MAP PRODUCTS AND FORECASTING APPLICATIONS

Frank E. Bunn, René Ramseier and Frank W. Thirkettle

All objects emit some black body energy and indeed, ice, snow and water are readily monitored from the NASA NIMBUS-7 satellite's scanning multifrequency microwave radiometer (SMMR). The SMMR is a second generation remote sensing system that provides a wealth of high quality real-time data from detectors operating at five frequencies in two polarizations.

In this paper we will outline the SMMR data format, collection, availability and daily coverage of all ice-bound regions of the world. We will describe the techniques for interpreting these emission intensity data; and will show the modelling methods used to obtain ice type, ice concentration and ice regions. The use of meteorological and on-the-ice calibration data that provide the critical regional information for use in these interpretive models will be discussed. We point out the efficiency of some models to describe first-year, multi-year and ice-water boundaries and the success of other models to produce ice concentration more accurately.

These highly successful sea-ice studies suggest several applications of microwave ice information in producing user map products and numerical data sets which will also be noted.

MAPPING AND DISPLAY TECHNIQUES USED FOR COMPUTER AUTOMATED SATELLITE IMAGERY SEA-ICE MAPPING PRODUCTS

Frank W. Thirkettle and Frank E. Bunn

Satellite remote sensors, such as the scanning multifrequency microwave radiometer (SMMR) used for monitoring sea ice, daily produce large volumes of data. The reception and computer tape storage of these data is the first step towards making use of such imagery. Both historical and real-time reception of NIMBUS-7 SMMR data will be discussed in this paper.

Many graphics and display systems are available today for presenting numerical data. We will describe our specialized data mapping, geographic projection overlay, contouring, and toiling removal of data over land techniques used for the study of sea ice. Automated computer cartographic mapping with ink on mylar products will be shown. Additionally, statistical data processing and plotter displays using a major commercial software package will be described with emphasis on its ability to produce a variety of readily interpreted display formats.

THE PROCESSING OF MARINE RADAR DATA FOR THE ENHANCEMENT OF SEA ICE IN THE PRESENCE OF SEA CLUTTER

G.L. Austin and M. Riley

The advantages of on line computer analysis of real-time scan converted marine radar images are discussed. Examples of the reduction of the effect of sea clutter and enhancement of targets using a system tested on the McGill Weather Radar are presented and discussed.

RADAR BACKSCATTER FROM SEA ICE IN THE FALL

R.G. Onstott, R.K. Moore, Y.S. Kim, S. Gogineni, D. Bushnell and R.O. Ramseier

Measurements of the radar backscatter of ice conditions near Mould Bay, NWT, Canada, were made during the fall (October) of 1981 as part of the FIREX/RADARSAT project. The measurements use the helicopter-borne University of Kansas microwave active spectrometer (HELOSCAT), operating over a frequency range of 4–17 GHz and an angle of incidence range 10–70°. A surface-based system was also used to make similar measurements, but with angles to 83°. Multi-year ice, a very large multi-year pressure ridge, first-year ice with varying degrees of small-scale surface roughness, grey ice with varying degrees of deformation, fast ice, and lake ice with and without a snow cover were investigated with the airborne system. A multi-year melt pond, a multi-year hummock and a smooth area of first-year ice were investigated with the surface-based system. These data indicate that there may be 4-dB variances in the average scattering cross-section of homogeneous first-year ice that has small-scale surface roughness that ranges from very smooth to rough. Multi-year ice frozen in grey ice was easily detected due to its 7-dB (at 5.6 and 9.6 GHz) or higher cross-section. Returns at 83° for smooth first-year ice and a flat multi-year hummock decrease rapidly as expected. Discrimination among these ice types was found to be better with Ku-X band than with C band frequencies.

X, C AND L BAND SYNTHETIC APERTURE RADAR (SAR) IMAGERY OF SEA ICE OBTAINED IN THE BEAUFORT SEA DURING OCTOBER AND NOVEMBER 1981

A.L. Gray, C.E. Livingstone, R.K. Hawkins and L.D. Arsenault

X, C and L band synthetic aperture radar (SAR) imagery of sea ice obtained in the Beaufort Sea during October and November 1981 will be described. The relative merits of the three channels will be compared and discussed in the light of some important end user requirements.

Some preliminary results will be presented using statistical information from a quantitative radar known as a scatterometer to predict the usefulness of SAR pixel brightness for image interpretation.

AN ANALYSIS OF RADAR SIGNATURE CHARACTERISTICS OF SEA ICE

Martin F. Price

The extension of Arctic drilling programmes outside the ice-free season requires reliable monitoring of the

behaviour of the ice system. Since Arctic areas are either in darkness or cloud-covered for much of the year, this information can best be acquired through the use of microwave sensors, having automatic interpretation capabilities.

To date, reflected microwave signatures of specific ice types have not been adequately defined. This paper presents a preliminary study of SLAR imagery and coincident aerial photography, obtained off the north coast of Alaska in 1980, to determine radar signatures typical of a wide range of ice types.

The initial stage of the study involved the identification of distinct components (subscenes) of the ice system within each photograph: 796 subscenes were identified. Subsequently, physical characteristics from the aerial photographs, and radar signature characteristics were described for each subscene, using nominal and ordinal scales. The major part of the study was a series of statistical analyses of these data. First, a group clustering procedure was used to develop a classification of ice types, based on physical characteristics. Twenty-four ice types were defined. Following a screening analysis, a discriminant analysis was used to determine whether the twenty-four ice types could be distinguished in terms of radar signature characteristics. The results showed significant differences between the characteristics recorded for the wide range of ice types. These results were used in the formulation of a key to ice types, based on these characteristics.

A secondary part of the study, using densitometric processing of SLAR images, showed that this technique could increase the information yield of such images. However, many variations in radar signature characteristics could not be explained by changes in physical characteristics, and vice versa.

Finally, recommendations are presented for further investigations of microwave signatures of sea ice, particularly relating to digital data acquisition programmes.

QUANTITATIVE RIDGE HEIGHT ESTIMATES FROM SAR

D.R. Inkster and R.T. Lowry

Numerical sea-ice dynamics models require detailed, reliable information of the mechanical properties of the ice sheet being modelled, an estimate of the drag exerted on the ice by the upper and lower fluids, as well as the mass redistribution as a function of time. Since Synthetic Aperture Radar (SAR) is the only sensor currently able to provide timely information, an effort has been made to develop techniques to extract quantitative information on sea-ice ridges from high resolution (2 m) SAR data.

The apparent radar brightness of ridges was found to be unrelated to their heights, however, apparent ridge width on the SAR was found to correlate with height as measured from shadow length on large-scale photography. Although parameters such as ridge orientation complicate the issue, both first-year and multi-year ridges gave encouraging correlations. As a result, a set of 15 first-year ridges was studied in great detail using height profiles from photography, and digital SAR imagery, density sliced. While a point-by-point comparison is not very reliable, the statistical comparison is most encouraging.

It appears that height distribution functions of both first-year and multi-year ridges, viewed at a variety of depression angles, can be successfully estimated using digitally analysed SAR imagery. The correlation between apparent ridge width and height is dependent upon azimuth viewing geometry and depression angle. These results can be described using a realistic radar scattering model for ridges. An attempt will now be made to implement the ridge height algorithm in an interactive ice images analysis system to yield a mass distribution and redistribution function, as well as drag coefficients.

Session 1B

DCP Networks/Stations

Wed. 1300-1500

ROLE OF SATELLITE REAL-TIME DATA IN WATER PROJECT MANAGEMENT

Thomas N. Keefer and Raul S. McQuivey

A recently completed GOES satellite-based real-time hydromet system allows engineers of the U.S. Bureau of Reclamation to greatly enhance irrigation and flood control management. The system covers the upper Snake River Basin of Wyoming, Idaho, and Oregon - over 100,000 mi.².

Bureau of Reclamation dams provide irrigation water, flood control and hydroelectric power. Project coordination and management are vital. The demand for irrigation water, power, recreation, and energy development is such that none can be wasted. Available quantities must be estimated quickly and storage, flood control, and power needs balanced for optimum use.

Historic data gathering practices often result in substantial delays from the time data are collected until they are available for management decisions. Typically, data may be recovered from remote gauges on tributaries only once a month. Delays of 6 to 8 weeks to obtain runoff data after recovery from the field are not unusual. Real-time data are required for accurate forecasting and management.

In the Fall of 1978, the Bureau of Reclamation issued a request for proposals (RFP) for the Boise-Minidoka Hydromet System (BMHS). The purpose of the BMHS was to procure an initial satellite-based, real-time data system expandable to cover the entire upper Snake Basin plus several other regions of interest. The RFP called for initial installation of 68 stations (streamgauges, precipitation, snow, etc.) with expansion capability to 300. The satellite system is highly effective, with data recovery of 95 to 99% when users operate their own receive site and the system is maintained properly.

Field data collection for the Sutron system is controlled by Data Collection Platforms (DCPs). Each DCP contains a microprocessor that is programmed to control data gathering encoding, and transmission. Each DCP will interface with up to 16 instruments. Transmission can be either at fixed times or at random times governed by a set of decision algorithms controlled by the user.

The real-time system is capable of generating large volumes of information. The present operational system will provide 120,000+ numbers per day. All incoming data are stored for a period of 10 days. In addition, real-time programs compute averages and other data for inclusion in a long-term archiving data base.

Data from BMHS stations are brought from a central receive site in Boise, Idaho to a Digital Equipment VAX 11/780 minicomputer in the Boise Federal Center. The VAX is capable of handling all data as well as providing a general purpose processor for hydromet calculations and modelling (forecasting).

Sutron provided system control and data retrieval through simple, sentence-like commands. Commands may be combined to simplify repetitive activities or report generation. Commands are used to add stations, remove stations, and control data transfer. New stations can be brought on-line in five minutes or less. Hydromet mathematics and graphics are included as well as real-time alarms and automated transfer to other users.

METEOR COMMUNICATIONS – CURRENT APPLICATIONS

John F. Kerns

Remote data acquisition systems currently in use in the United States that incorporate meteor burst communication techniques for near real-time, bi-directional communication are as follows: meteorological, satellite survey, wave-measuring, tide-measuring and long-range alpha-numerics for forest fire communication.

SNOTEL – A STATUS REPORT

Manes Barton, Donald Woodward and Robert Rallison

Since 1979, the Soil Conservation Service, USDA, has collected snow and other meteorological data at 475 remote sites in the Western States.

The system designated SNOTEL transmits the data collected from remote locations to the master polling station through reflection of VHF signals by ionized meteor trails.

Eighty-five to ninety per cent of the stations are responding within three hours after the morning all-station poll. Performance problems continue to be related to lack of power, equipment failure, sensor problems and antenna orientation. The Soil Conservation Service is working on these problems. The data are increasingly being used by the Service and a wide range of cooperators.

READAC – THE ATMOSPHERIC ENVIRONMENT SERVICE'S NEXT GENERATION AUTOMATIC WEATHER STATION

D. Dockendorff

In December 1980 the Atmospheric Environment Service established a contract with Bristol Aerospace Limited for the development of a new multi-purpose automatic weather observing and reporting station to replace existing stations that are rapidly becoming obsolete, and to better meet data acquisition needs. This

new generation autostation is based on the Remote Environmental Data Acquisition Concept (READAC), which is described along with the present status of the development programme.

ALBERTA ENVIRONMENT DCP HYDROLOGY NETWORK

D. Graham and R. Grauman

This paper will review the four-year programme experience by Alberta Environment of developing a large DCP (RTV) based hydrology data collection network. In particular, the various major decision criteria at different programme points will be reviewed including: network study results, procurement trials, installation procedures, sensors used, results, and hindsight evaluation of results to date and their impact on future plans.

LAND BASED AUTOMATIC WEATHER STATION

W.C. Thompson

Petro-Canada installed three automatic weather stations on islands off the Labrador Coast to obtain weather data to assist with engineering planning and design of offshore structures. The stations operate through the GOES satellite. The data are transmitted to Calgary over weather service circuits where they are decoded and made available to the AES for forecast purposes. Some of the problems associated with station operation and maintenance, data recovery and data exchange are outlined.

"RÉSEAU DE TÉLÉMÉTRIE PAR SATELLITE": ACQUISITION EN TEMPS RÉEL DES DONNÉES HYDROMÉTÉOROLOGIQUES AU QUÉBEC

Claude Pesant

L'expérience Québécoise en télémétrie débuta en 1977. L'acquisition d'un mini ordinateur dédié exclusivement à la collecte des données hydrométéorologiques nous a permis d'intégrer la télémétrie au programme d'inventaire des ressources eau et climat sur le territoire du nouveau Québec.

Ce système d'acquisition des données en temps réel est devenue un outil de gestion des réseaux des stations hydrométéorologiques implantées en région nordique.

L'auteur traite entre autres des objectifs, du mode de fonctionnement, du traitement informatique des données en temps réel, de la performance et des perspectives d'expansion de ce réseau.

Session 1C Large-Scale Circulation

Wed. 1300-1500

THE BAFFIN ISLAND PARADOX

John L. Knox

We have recently completed a study of the spatial and temporal distribution of blocking in the Northern Hemisphere, for the 33-year period, 1946 to 1978, inclusive. In order to identify blocking episodes by machine processing methods, a technique was developed that relates blocking to the corresponding positive anomaly of 5-day mean 500-mb height. Anomalies meeting the criteria are called "blocking signatures".

The seasonal frequency of occurrence of these signatures is presented both by longitude and by area. The results are in good agreement with published results for the oceans, but they also reveal a high frequency of blocking signatures over the northeastern Canadian Archipelago. This result, "The Baffin Island Paradox", is so-called because the frequency maximum coincides with the location on the mean 500-mb trough.

From examination of a set of case studies the paradox is rationalized. Moreover, it is found that by Fourier analysis of 7 winters of 500-mb data around 60°N, a Baffin blocking episode is usually dominated by a retrograding wavenumber 1 harmonic substantially west of its normal position.

The interannual variability of blocking over the northeast Canadian Archipelago during the past decade will be examined and related to the behaviour of the climate over North America.

THE EFFECTS OF LATITUDINAL ASYMMETRIES ON BAROCLINIC INSTABILITY

Charles A. Lin

Baroclinic instability of zonal flows with different latitudinal structures is examined, using a linear, quasi-geostrophic two-level β -plane model. The flows have different amounts of skew, with respect to the channel centre, at different vertical levels. The results are interpreted in terms of the instability of the baroclinic components of the zonal flows. Because of the presence of latitudinal asymmetries, a spectrum of meridional modes, consisting of the gravest mode between equator and pole and its harmonics, is generated in the perturbation. In general, the meridional spectrum has two peaks: a primary peak at the planetary scale, and a secondary peak near the radius of deformation. The former is the scale of the basic flow, and is present as an explicit scale. The latter scale is the natural response scale of a perturbed simple baroclinic zonal flow. As neutral stability is approached, the radius of deformation becomes more important, i.e. there is a tendency for more small-scale structure near neutral stability. The perturbation zonal scale is close to the radius of deformation. The eddy amplitudes and momentum fluxes are also examined. The case that best applies to the atmosphere is discussed.

ASPECTS OF THE STRATOSPHERIC CIRCULATION REVEALED BY NMC UPPER ATMOSPHERE ANALYSES

Kevin Hamilton

The National Meteorological Center (NMC) produced weekly objective analyses of the temperature and geopotential in the Northern Hemisphere at 5, 2, 1 and 0.4 mb from July 1976 to April 1980. The analyses were based on both satellite (radiometer) and rocketsonde data and are believed to be significantly better in quality than the more recent NMC upper atmosphere analyses that are based on satellite data alone (Gelman et al., 1981). In the present study this upper stratospheric data was combined with the NMC daily analyses at 100, 70, 50, 30 and 10 mb. A monthly mean stratospheric climatology was then constructed from these analyses. Meridional sections of the zonal mean values of the temperature, geostrophic zonal wind and the eddy heat and momentum transports associated with the geostrophic component of the wind were produced. The results confirm the conventional views concerning some aspects of the stratospheric circulation. For example, the eddy transports in summer are dramatically reduced from those in winter. There were also some mildly surprising findings, however. In particular, there seems to be fairly strong eddy heat and momentum fluxes associated with zonal wavenumbers 3, 4 and 5 in winter. It was also interesting to find that the polar night jet in each of the four winters was much stronger in December than in January and that the December zonal mean zonal winds can reach almost 100 m s^{-1} below the stratopause.

SOME FEATURES OF SIMPLE MODELS OF THE STRATOSPHERIC QUASI-BIENNIAL OSCILLATION

Kevin Hamilton

The Holton-Lindzen (HL) model of the interaction of equatorial waves with the zonally averaged flow appears to provide a convincing explanation of the quasi-biennial oscillation (QBO) of the mean zonal winds in the tropical stratosphere. The actual numerical model that HL used in their original paper was greatly simplified in a number of respects, however. In particular, their model domain extended only from 17 to 35 km and they imposed a no-slip boundary condition on the mean zonal winds at their lower boundary. In the present study a number of calculations were performed with somewhat more sophisticated versions of the HL model. One set of calculations was carried out with a model extending from the tropopause to 70 km. It was found that the simulated QBO in this model had a very realistic vertical structure throughout the stratosphere when realistic thermal (radiative) damping of the waves was included. This suggests that neither mechanical damping nor photochemical acceleration of the thermal damping of equatorial waves is important in the dynamics of the tropical stratosphere.

A second set of calculations was performed with explicit inclusion of thermal excitation of the waves in a region of the model domain corresponding to the lower troposphere. The results of these calculations were compared with those from a model that employed HL's no-slip boundary condition at the tropopause level. The simulated stratospheric mean flow evolution was quite similar in the two models as long as a realistic profile of mean flow dissipation was included. Thus the present calculations tend to support the

validity of HL's lower boundary condition and suggest that mechanistic QBO models need only explicitly include the stratosphere.

EQUATIONS IN PRESSURE COORDINATES FOR THE "NON-FLAT" EARTH

G.J. Boer

The meteorological equations of motion attain their simplest form when pressure is used as the vertical coordinate. This apparent simplicity is offset, however, by the fact that the lower boundary is not a coordinate surface but a function of both position and time ($p_s = p_s(\lambda, \phi, t)$).

This complication of the lower boundary condition has led to widespread use of the sigma vertical coordinate $\sigma = p/p_s$, for which upper and lower boundaries are coordinate surfaces. The resulting equations are more complex, however, and coordinate surfaces are not horizontal. The simplicity of the equations in pressure coordinates often leads to the "flat-earth" approximation whereby the complexity of the lower boundary condition is ignored and the boundary conditions applied for $p_s = p_0$, a constant.

A formalism is presented that allows analytic and diagnostic developments in pressure coordinates in a manner that is straightforward and exact. The use of the formalism is demonstrated by a number of examples from analytic and diagnostic studies of the atmosphere in which hitherto neglected terms arise in the equations.

A SYNOPTIC STUDY OF THE CANADIAN GENERAL CIRCULATION MODEL

Steven Lambert

A synoptic study of the Canadian General Circulation Model was undertaken by examining the daily 500- and 1000-mb fields produced by an annual cycle simulation. The model's synoptic features, e.g. storm tracks, east coast storm development and blocking, are examined and compared with observations.

SOME PRELIMINARY RESULTS ON THE EFFECTS OF A GRAVITY WAVE DRAG PARAMETERIZATION ON SIMULATIONS OF THE ATMOSPHERIC CIRCULATION

N.A. McFarlane

A very simple parameterization of the sub-grid scale vertical momentum flux due to vertically propagating gravity waves has been introduced into the AES global circulation model. The parameterization assumes that vertically propagating gravity waves are generated owing to flow over mountainous terrain when the lower atmosphere is statically stable. The horizontal scales of these waves are shorter than those resolvable in the model but long enough so that they are approximately hydrostatic.

Two-dimensional steady-state linear theory is used to determine the vertical momentum flux at a point due to these waves as a function of the (model-determined) Brunt-Väisälä frequency and horizontal flow fields. A highly simplified representation of the sub-grid scale topography is used for this purpose. It is assumed that most of the momentum flux divergence occurs in a vertically narrow region near the level where wave-breaking occurs.

Some preliminary results from a January simulation using this parameterization will be presented and compared with a simulation for the same time period but without the gravity-wave drag parameterization. Areas of possible improvement will also be discussed.

JANUARY AND JULY SIMULATIONS BY A TWO-LEVEL SPECTRAL GCM WITH MINTZ-ARAKAWA PHYSICS

Neil Sargent

Investigation shows the mean sea-level pressure in the two-level spectral model with Mintz-Arakawa physics to be particularly sensitive to the extrapolation of the wind to the surface from the two model levels. With a carefully chosen extrapolation the model gives reasonably good January and July simulations. Some results and examples are presented and discussed.

THE SPACING OF ICE BANDS AHEAD OF A WIND-BLOWN ICE FIELD

Paul H. LeBlond

Alternating bands of ice and free water are observed at the edge of an ice field (in the Bering Sea, on the Labrador coast...) when the wind blows seaward over the latter. The spacing of these bands is investigated by bringing in surface wave generation in the ice-free gaps, as well as internal wave production at the ice-water transition because of a possible discontinuity in drag coefficient.

A NORTHERN LABRADOR POLYNIA

John P. Newell

Analysis of satellite imagery for 1981 indicated that a semi-permanent polynya existed in the area east of the Torngat Mountains, Labrador. The relationship between the existence of this polynya and meteorological and oceanographic factors is examined and a number of possible mechanisms for its formation are proposed. In addition the importance of this feature to biological activity in the area, the climate of northern Labrador and exploration for offshore oil are elaborated upon.

HISTORICAL ICE COVER ANALYSIS OF NORTHWESTERN BAFFIN BAY

John D. Miller

A study of the historical (1959-1972) ice cover of Baffin Bay and Lancaster Sound was undertaken using the digital data archive compiled by the Atmospheric Environment Service. These data were analysed to determine the probabilistic attributes of the ice cover on a site by site, week by week basis.

Data products include the variation in ice types, concentrations and floe sizes for all sites over the summer season. The probabilistic format facilitates the retention of the total time variability of the data, at the same time permitting simple mathematical formulation for alternative applications. Derived products include the development of synthetic ice cover distributions allowing the simulation of "good", "median" and "bad" ice seasons.

EARLY WINTER ICE MOTION IN HUDSON BAY

W.E. Markham

A drifting buoy placed in Hudson Bay for meteorological reporting purposes during the summer continued reporting well after freeze-up. The path of its motion during December and January is analysed in relation to meteorological conditions and some conclusions are drawn as to the resulting ice deformation.

FLUCTUATIONS IN SEA-ICE CONDITIONS IN THE QUEEN ELIZABETH ISLANDS

B. Alt, D.A. Fisher and R.M. Koerner

Deep ice cores taken from Devon Island Ice Cap and Agassiz Ice Cap yield climate-related records in the form of oxygen isotope ratios (annual temperature) and melt-layering (summer temperature). There is a good correlation between melt layer percentage from Devon Island Ice Cap and summer sea-ice conditions in the Queen Elizabeth Islands. Individual seasons of extreme sea-ice conditions during the period of record are examined. These are then seen in the context of the melt layer record for the past 1000 years and a projection of this record for the next 50 years. The relationship of summer temperature to annual temperature is discussed. Estimates are made of the magnitude of past and future fluctuations of sea-ice conditions in the Queen Elizabeth Islands and the impact of such fluctuations.

SENSOR REPAIR AND OVERHAUL. AN OVERVIEW OF SELECTED HYDROMETEOROLOGICAL SENSOR PROBLEM AREAS

R. Grauman

The paper will examine problems associated with the life cycle operation of various sensors. In particular, the following groups of sensors will be reviewed: anemometers, air temperature, relative humidity, rainfall, precipitation, water level, snow pillows and atmospheric pressure. Various sensors will be reviewed in detail and examples presented of typical problem areas. Suggestions for improved sensor life cycle results will be made.

THE PROBLEMS ASSOCIATED WITH THE INSTALLATION OF INSTRUMENTS THAT USE SATELLITE DATA COLLECTION PLATFORMS

J. Whiting

The Saskatchewan Research Council began installing Data Collection Platforms (DCP's) in 1979. These stations measured hydrometeorological parameters. In the field trials, problems were found with electronic interference between sensors. Later as more sites were operated, studies were conducted to ensure that enough data checks were made by the field crews for the best use of achieved data.

In 1981, the DCP system was expanded to include air and water quality sensors for total radiation (alpha, beta and gamma), PH, conductivity and dissolved oxygen.

New sensors have also been designed at SRC to fill the need of external clients, and have included water level and precipitation sensors designed for -40°C operation.

WATER LEVEL ENCODERS: A RELIABLE, COST-EFFECTIVE CANADIAN ALTERNATIVE TO THE MEMOMARK

R. Grauman

The paper will present the results of a new Optical Shaft Encoder (OSE) development programme. An analysis will be presented of the various operational problems associated with Memomarks and the elimination of the problems through the use of the OSE designed by Wellsdale. The encoder will be described in detail and test results will be presented. Specifications for the encoder were jointly developed by Wellsdale and Water Survey of Canada.

SHIPBOARD AUTOMATIC WEATHER STATION (SAWS)

W.C. Thompson and R.C. Atkins

During 1981, Petro-Canada contracted Micrologic Ltd of Calgary to design and build an automatic weather station (SAWS) for shipboard use. The station was composed of a microcomputer, GOES transmitter and antenna, meteorological and oceanographic sensors, and a unit to interface with the ship's navigation system. The unit was designed to monitor wind speed and direction; atmospheric pressure; air temperature; relative humidity; ship's speed, heading and position; ocean currents and sea-surface temperature. Provision was made for hand entry of other elements so that synoptic marine observations could be transmitted in accordance with international standards. The system had short-term storage capabilities to facilitate quality control and data archival.

DRIFTING BUOYS

W.C. Thompson and J.R. Buckley

Petro-Canada deployed two drifting buoys on Saglek Bank on the northern Labrador Coast on October 8, 1981. The buoys were equipped with atmospheric pressure and sea-surface temperature sensors. Data were transmitted from Service Argos back to Calgary via the Global Transatlantic System and weather service communications. The location data gave useful information on the structure of the Labrador current and water exchange through the saddles. The pressure data were assessed for their utility in improving the quality of surface analyses for forecasting purposes.

LIGHTNING DETECTION, DCP'S AND A COST-EFFECTIVE SENSOR

R. Grauman and L. Byerley

The paper will present the results of a joint industrial development programme conducted during 1981. The aim was to develop a DCP-based lightning detection sensor with a selectable range of 5 or 30 km. The sensor is designed to augment the more sophisticated LLP units having 200-km ranges. A prototype is currently under evaluation by the Atmospheric Environment Service. Various uses to forestry, utility, oil company and other groups will be discussed.

LE PROJET BOA II

M. Gagnon, R. Noel et C. Marche

Les caractéristiques théoriques d'une bouée océanographique autonome de type spar présentement en construction par une firme Rimouskoise (J.L. Electron) seront présentées et discutées.

Une conception originale permet d'allier les avantages des bouées à ancrage libre avec ceux à ancrage forcé. Un bon coefficient d'amortissement vertical et un fort moment de rappel permettent à la bouée principale de résister adéquatement aux roulis et au pilonnage de la houle. Ce type de bouée est conçue pour la transmission, l'enregistrement et le traitement en temps réel des paramètres océanographiques et atmosphériques dans des conditions environnementales difficiles.

Session 2C

Boundary-Layer and Mesoscale Modelling

Wed. 1530-1715

PASSIVE SCALAR CONVECTION BY A PRESCRIBED RANDOM VELOCITY FIELD

William Perrie

Passive scalar convection by a prescribed random velocity field is represented in terms of integral equations. Primitive perturbation expansions are constructed by iterating these integral equation representations as in Kraichnan (1977). First and second iterations of elemental functions within these expansions are assumed quadratically integrable with respect to space and time, that is, they are assumed to belong to the space L_2 . Line-renormalized perturbation expansions are constructed, corresponding to these primitive perturbation expansions, which converge almost everywhere. The direct interaction approximation and the Lagrangian history direct interaction approximation are the simplest truncations of the appropriate line-renormalized perturbation expansions.

A THREE-DIMENSIONAL SECOND-ORDER CLOSURE MODEL FOR THE STUDY OF THE PLANETARY BOUNDARY LAYER

Sandor Csanady

A 3-D mesoscale boundary-layer model has been developed using a higher order closure technique to numerically study parameterization possibilities as well as study the structure and 24-h evolution of the planetary boundary layer. The model uses eight coupled differential equations among which four explicitly deal with the time-development of second-order moments. These higher order rate equations are systematically simplified in their diffusion and tendency terms using their departure from isotropy for ordering criterion. This type of simplification was first investigated by Mellor (1973), who showed that little predictive accuracy was lost, but considerable computational saving resulted from it.

The model uses 37,000 grid points spaced 127 km apart horizontally, and logarithmically spaced vertically with an average 25-m separation up to 2-km height. Centred space differencing is used except adjacent to boundaries, where one-sided derivatives are used to prevent reflection. Time integration is done by the implicit Laasonen method with 1-min time step. Unfortunately some numerical instability still developed that was suppressed by using Shumann's 9-point filter in horizontal directions at each time step.

Initial conditions for U , V , T and q were derived via a Cressman-type objective analysis from real-time data, where linear interpolation was applied to fill the vertical levels. Initial values for $e = \frac{1}{2} u_i u_i$, $\bar{\theta}_i^2 \bar{q}^2$ and $\bar{\theta} q$ were uniformly set to 1 except at the lower and upper boundaries where similarity theory and ad hoc data were used, like $e_H = \bar{\theta}_H^2 \bar{q}_H^2 = 0$.

Different length-scale formulations were tried, including a differential equation by Mellor with various effects on the simulation accuracy. The best result followed from using separate length scales for thermally stable and unstable stratifications but overriding it with the minimum length scale.

The model successfully simulated the nocturnal jet and the distribution and development of turbulence quantities, with particularly good results in the decomposition of turbulent kinetic energy budget into diffusion, buoyant production and pressure transport balanced by dissipation.

One other result is the re-evaluation of universal functions A and B from model computations that resulted in new numerical values for A and B and the verification of their baroclinicity dependence, which will be presented in a separate paper.

BAROTROPIC INSTABILITY IN A GRAVITATIONALLY UNSTABLE ENVIRONMENT

G.W. Kent Moore

Recent field studies and numerical models have revealed mesoscale structure associated with synoptic-scale events. In particular, the field work of Hobbs and Browning on cold fronts has indicated that precipitation along the front is organized into regularly spaced cores. Orlanski has observed similar structure in a numerical model of a cold front.

In an attempt to explore the spacing of the cores, a linear stability analysis was performed on a simplified frontal model. Results indicate a preferred length scale at which instabilities develop. This is a result of a coupling between the barotropic and gravitational instabilities.

BOUNDARY-LAYER FLOW OVER LOW HILLS: COMPARISON OF MODEL RESULTS AND WIND-TUNNEL DATA

John L. Walmsley

A review will be presented of four versions of a computer model for neutrally-stratified boundary-layer flow over low hills. Based on the Jackson and Hunt (1975) two-dimensional theory, a model was adapted for three-dimensions and simplified by Mason and Sykes (1979). It was subsequently referred to as MS3DJH/1 by Walmsley, Salmon and Taylor (1982) who described a modification (MS3DJH/2) that led to improved results near and above the top of the model's inner layer. Preliminary tests using a less accurate but more computationally efficient approximation to this modification (MS3DJH/1.5) were encouraging. Further model refinements (MS3DJH/3) by Taylor (1982) eliminated problems associated with the velocity scaling.

In order to evaluate the MS3DJH model versions, they will be applied to ideal two-dimensional terrain and the results will be compared with wind-tunnel data and with finite-difference model simulations.

MODELLING AND VALIDATION OF THE DAYTIME MIXED LAYER DEPTH AT TWO COASTAL SITES

D.G. Steyn and T.R. Oke

A mathematical model of the mixed layer depth based on the thermodynamic analysis of Tennekes (1973) is generalized to include the effects of advection and subsidence. The effects of advection on the mixed layer depth have been modelled by setting the model equations in a Lagrangian frame, performing an approximate first integral in order to derive the spatial dependence of the model variables, and using these spatial forms to give a set of Eulerian equations. The effects of subsidence have been modelled by imposing a subsidence velocity on the top of the mixed layer as well as allowing subsidence-induced warming above that layer.

The model thus derived consists of a system of non-linear differential equations that may be numerically solved to elucidate the temporal behaviour of the mixed layer depth. The boundary conditions necessary for such a solution are drawn from field studies at two coastal sites; one with a relatively simple coastline and essentially flat land under agricultural use, and the other with a considerably more complex coastline, rolling relief and mixed land use (agricultural, parkland and urban). The atmospheric variables determined at these sites include turbulent sensible heat flux, wind speed and direction, inversion intensity, subsidence parameter, and mixed layer depth. The modelled evolution of the mixed layer depth is in both cases in very good agreement with the measured depth.

The sensitivity of the model to all the input variables is investigated by examining the dependence of the maximum mixed layer depth on each of these variables in an artificial data set. The sensitivity is shown to be variable and non-linear for all input variables.

Special Session Today and Tomorrow

Thurs. 0800-0945

METEOROLOGY IN CANADA

J.P. Bruce

OCEANOGRAPHY IN CANADA

G.N. Ewing

NSERC - METEOROLOGY AND OCEANOGRAPHY

Gilles Julien

Session 3A Sea-Ice Modelling

Thurs. 1015-1200

THE ATMOSPHERIC ENVIRONMENT SERVICE REGIONAL ICE MODEL (RIM) FOR OPERATIONAL APPLICATIONS

V.R. Neralla, R.G. Jessup, S. Venkatesh and E.C. Jarvis

This paper describes the development and simulations of a regional scale sea-ice dynamics model (RIM) for obtaining short-range, real-time or near real-time predictions of ice conditions for operational use. This model is an adaptation of the seasonal sea-ice dynamic-thermodynamic model developed at CRREL (Cold Regions Research and Engineering Laboratory). It consists of (1) a momentum equation that includes air-to-ice stress, water-to-ice stress, Coriolis force, pressure gradient force due to tilt of the sea surface and internal ice stress, (2) a constitutive law that relates ice stress to strain rate and ice strength and (3) continuity equations for ice thickness and concentration. For treating internal ice stress, the model uses a plastic viscous constitutive law with the plastic strength dependent on ice thickness and concentration. A finite-difference numerical procedure is used for solving the equations.

The RIM is applied over the Beaufort Sea area using a 22×22 grid array with a grid distance of 42.3 km and a time step of 3 h. Model simulations out to 48 h are performed and the simulated drifts compared with buoy motion data collected during the period November/December, 1979. The comparisons show the simulated drifts to be in reasonable agreement with observed buoy motions. A number of sensitivity and model sophistication tests are planned to further validate the model before implementation for routine operational use.

NUMERICAL ICE PREDICTION AT ICE FORECASTING CENTRAL

J.C. Falkingham

Ice Central has been involved in developing numerical ice prediction models for operational use during the past two years. This paper describes the real-time forecasting problem faced by Ice Central and how numerical models are used as guidance. Operation of the Neralla model, which is currently in use, as well as a modified Hibler model, which is being experimented with, is described. Emphasis is placed on the problems faced when operating these models in a real-time environment, and on various solutions to these problems.

Also described in this paper is a digital ice information system currently being developed under contract. This system is designed to store graphical ice information and allow output of this information both graphically and digitally. This will help overcome a major problem in ice modelling, the input to the model of initial ice conditions.

AN INTEGRATED ICE DYNAMICS MODEL FOR THE CANADIAN ARCTIC

E. Leavitt, T. Wong and E. Krakowski

Working in a joint programme with the Government of Canada and Dome Petroleum Limited, INTERA developed a Fine Scale Ice Mechanics Model (FSM). The Atmospheric Environment Service (AES) concurrently developed a Regional Scale Ice Dynamics Model (RIM). The objective of the programme was to develop a model that would provide accurate forecasts of ice velocities and ice deformation at specific sites with high resolution. The FSM component was to provide the actual site-specific forecasts, and the RIM, to provide a regional forecast as well as boundary conditions for the FSM.

The FSM solves the momentum-balance equations for sea ice using a finite-element technique and the ice cover is characterized using a four-category thickness distribution model. The RIM solves the momentum balance using a finite-difference technique and the ice cover is characterized using a two-category thickness distribution.

Results of the combined FSM/RIM hindcasts using data collected in the Beaufort Sea by Dome and AES will be presented. The advantages and disadvantages of the combined approach will be discussed.

AN OPERATIONAL ICE PACK PREDICTION MODEL AND SYSTEM

R. Sinclair and J. Clodman

A comprehensive, computerized ice-prediction system that contains, as a central feature, an ice model with certain novel aspects has been developed by the MEP Company for installation at the Canadian Ice Forecasting Central.

The MEP ice model uses a time-dependent ice-momentum equation containing air and water-stress terms, the Coriolis force, and internal and external ice-resistance forces. The resultant ice-velocity fields drive the ice-compactness equation utilizing advanced numerical procedures. In addition to predicting ice-compactness fields the model has the capability of providing indications of regions of ice-grounding, ridging, and lead formation.

The ice-prediction-system, as a whole, has one or more ice models resident at the CMC computer. These models access predicted and analysed winds from CMC output. Other major components of the system are located at Ice Central. These modules permit ice-data input, interactive control of analysed and forecast fields, and selection of graphical and digital outputs.

The system can be operated at two levels. The first level allows routine operational ice forecasting in which a pre-selected model(s) will operate over specified regions at scheduled times based on previously input ice data and provide regular ice forecasts and analyses.

The second of the two levels permits a much wider flexibility and capability for Research and Development, special forecasts, model tests and model comparisons. Under this mode, variation in grid area, model selections, nature and orientation of outputs, etc. is permitted. Also, analysed and forecast wind and ice fields can be modified for use in re-initialization of the forecast procedure. Verification and comparison data can be obtained for model tuning, model comparison and model upgrading.

RECENT RESULTS FROM THE LABRADOR SEA-ICE MODEL

J.S. Foley and T.E. Keliher

Previous simulations with this model have been carried out for large-scale data (Keliher et al., 1981; Denner and Keliher, 1981). The agreement with the analysed ice data has been generally reasonable, but a number of deficiencies were identified. One of these was a lack of input data of sufficient detail so that it was not clear whether the lack of agreement was due to the model or the quality of the input. There is one period in February 1977 when a field programme in the Labrador Sea attempted to collect an integrated data set of wind, current, and ice parameters on a scale of 10 to 20 km. This programme was called the SHIP-IN-THE-ICE programme and is summarized in Ledrew et al. (1977). The winds were collected at the ship, and the ship's position was determined from both standard and satellite navigation techniques, giving its drift. In addition, the relative positions of radar reflectors on the ice and selected icebergs were measured. Current profiles, relative to the drifting ship, were taken to 100 m. Some radiation measurements were also collected that are relevant to the modelling of ice growth.

The results of these simulations will be presented for both the large-scale and small-scale data described above. The large-scale data are determined from surface weather charts for the winds, the ice analyses charts for the ice data, and a revised climatological current data set. This will be the first simulation using this new current data set. In addition, some results of the modelling of ice growth will be presented.

References

- DENNER, W.W. and T.E. KELIHER, 1981. Numerical modelling of Labrador pack ice dynamics. To be published in Volume III of the Proceedings POAD-81, Québec (Québec), July 27-31.
- KELIHER, T.E.; W.W. DENNER, and J.S. FOLEY, 1981. Sea ice dynamics in the Labrador Sea. Presented at the Fall Meeting of the American Geological Union, San Francisco, U.S.A., 7-11 December 1981; submitted for publication in *J. Geophys. Res.*
- LEDREW, B.R. ET AL. 1977. Ship-in-the-Ice data report. C-Core Report 77-28, St. John's Nfld.

A ONE-DIMENSIONAL MODEL OF SEA-ICE THERMODYNAMICS

R. Gabison and B. DeLorenzis

A one-dimensional sea-ice thermodynamics model applicable to the HP-1000 minicomputer and designed to predict hourly changes in sea-ice thickness and the onset of freeze-up and breakup is presented in this paper.

The model incorporates a derivation of the oceanic mixed-layer in terms of water density stratification and wind-stress induced mixing. Sea-ice surface temperatures are derived by the application of a thermal energy balance at the sea-ice surface. To account for both the penetration of the solar radiation in the ice and the surface albedo, the solar radiation is decreased by empirically determined amounts.

Water density is initialized in the oceanic mixed-layer by the application of a third-order regression using monthly average values of temperatures and salinities.

The response of the model to various meteorological and oceanic conditions is studied. Hourly growth and melting rates of sea ice are expressed in terms of varying sea-ice thickness, ice, salinity, depth of the snow covering sea ice, intensity of the solar radiation, surface wind speed, temperature and humidity in the lower atmospheric constant-flux layer.

Results from the application of the model indicate that it responds reasonably well to varying synoptic and oceanic conditions and that it realistically simulates the growth and the melting rates of sea ice.

Session 3B

Weather Forecasting

Thurs. 1015-1200

AUTOMATED FORECASTS OF MAXIMUM AND MINIMUM TEMPERATURES FOR CANADIAN STATIONS

N. Brunet, R. Robinson and N. Yacowar

Automated forecasts of maximum and minimum temperatures for the next five days have been issued by the Canadian Meteorological Centre for more than a decade, based on regression equations applied to output from atmospheric models.

New equations have been developed using a larger and more comprehensive data set. Further output should better reflect the expected state of the atmosphere below 850 mb and overcome some of the deficiencies in the current model.

Preliminary tests under operational conditions have shown that a tendency to predict too high a frequency of extreme values has partially destroyed the improvement in root-mean-square error that was expected, and an attempt is now being made to find a "deflation factor" that will both preserve sufficient sharpness in the forecasts and also improve their accuracy.

AUTOMATED PREDICTION OF SURFACE WIND USING THE PERFECT PROG TECHNIQUE

A. Maarouf

A numerical-statistical method for objectively producing forecasts of surface wind has been developed at the Meteorological Services Research Branch. The method uses Perfect Prog, a technique that determines a

statistical relationship between the predictand (surface wind) and observed variables and/or variables derived from actual observations. These variables are screened from a large number of potential predictors using a forward stepwise screening regression procedure. A 10-year data-base was used as the dependent sample. Separate equations for the u and v wind components and wind speed s were derived for selected stations across Canada for each of the four seasons. Wind forecasts were obtained from an independent data set consisting of 2 years of CMC spectral model output for projections of 12, 24 and 36 h. The verification statistics indicate that Perfect Prog produces better forecasts than persistence and climatology. The usefulness of this technique as a forecasting tool is discussed.

MOS FORECASTS OF SURFACE WIND SPEED AND DIRECTION AT CANADIAN STATIONS

W.R. Burrows

The Meteorological Services Research Branch has begun development of Model Output Statistics equations for Canadian stations based on the output of the Canadian operational spectral model. Surface wind has been chosen as the first element for equation development, based on stated operational priorities.

The development data set consists of 2 years of spectral model output at 12-h intervals to 36 h. Predictors were pre-screened for expected physical relationship to the wind predictands and derived predictors were added to the basic set to attempt to catch known low-level physical influences on the wind. Separate equations were derived for each of 11 stations for valid times of 00 and 12Z. No seasonal stratification was done. The predictand is 3-h averages of u component, v component and speed s , centred on the valid time. A unique feature of the method is that u and v wind components can be oriented to lie along the valley and across the valley, respectively, at stations where valley effects are important. Forward stepwise (Efroymson) screening regression was used.

Tests on the dependent sample show that reductions of variance range from 55 to 75% for the 12-h forecasts, to 40 to 55% for the 36-h forecasts. Stations in mountainous areas produce the lowest percentages of explained variance, while stations in Atlantic Region produce the highest percentage of explained variance. These percentages are comparable to those obtained in the U.S. MOS System. Characteristics of the equations will be shown along with results of tests on independent data.

POSITION AND CENTRAL PRESSURE ERRORS OF LOW PRESSURE CENTRES ON MANUAL AND MACHINE PROGS

I.B. Findleton

In 1978 the Canadian Meteorological Centre began collecting data on both the displacement errors and central pressure errors of storm centres forecast over the North American operating area. These data have been organized into a database of storm system histories that is being used to evaluate the quality and reliability of forecasts of storm system development issued by the Canadian Meteorological Centre. In addition to providing a measure of current state of the art in synoptic-scale forecasting, comparative analysis of subjectively and objectively produced forecasts sheds some light on the contribution of human input to the forecast production process.

AUTUMN CYCLONIC STORMS OVER SOUTHERN ONTARIO

T.B. Low, R.E. Stewart and B.D. Kalanda

Under the auspices of the Rainsat programme of the Atmospheric Environment Service, a series of cyclonic storms over southern Ontario was studied in November 1981. Measurements were obtained from a 5-cm wavelength radar, visible and IR satellite imagery, and 35 sequentially-released rawinsondes. The simultaneous measurements were directed towards understanding the mesoscale structure of and precipitation processes occurring within autumn storms in order to improve satellite/radar techniques for short-term precipitation forecasting.

Initial analysis has shown isothermal or near-isothermal layers near 0°C due to melting to be quite common. Much of the precipitation (at rates $\leq 10 \text{ mm h}^{-1}$) was associated with banded structures. Areas of cloudiness were found to far exceed areas of precipitation. Comparisons between the structure of these storms and those of mid-latitude cyclonic storms elsewhere will be discussed.

ON THE ECONOMIC VALUE OF TWO DECADES OF WINTER-TIME TEMPERATURE FORECASTS FOR TORONTO

A. Stuart

The economic value of weather information is dependent upon many parameters, but two of the most important are forecast accuracy and user sensitivity. For temperature forecasts, user sensitivity is characterized by certain cost-loss matrices; several such matrices are developed to simulate the sensitivity of various users, and optimum strategies for such users are obtained. These are then applied in an *ex post* analysis of 24-h forecasts of maximum temperature for Toronto. Changes in economic value to each user class over the past 20 years are discussed, and in this way, the impact of accuracy changes during this time period are estimated. In addition, the variability in economic values caused by user sensitivity characteristics is also discussed.

NON-METEOROLOGICAL FACTORS IN THE PUBLIC FORECAST PROCESS

D.W. Layton

Basic forecast theory, as applied to public forecasts, suggests that once the questions of what? where? when? and how much? are answered, the forecasting process is ended. It is felt that almost all experienced forecasters would deny this fact. To a greater or lesser degree, almost all public forecasts are influenced by one or more non-meteorological factors. An attempt will be made to examine some of these factors and the ways in which forecasters attempt to minimize their influences. Factors examined will be: time of issue, target audience, regional wording problems, past weather, length of forecast, severity of weather, revisions to forecasts, first impressions, and external pressures from translation and commercial radio.

Session 3C Biometeorology

Thurs. 1015-1200

BOWEN RATIO DETERMINATIONS OF SURFACE RESISTANCE IN WETLAND EVAPORATION

D.S. Munro

Micrometeorological measurements of temperature and humidity differences were obtained over a wooded swamp, on selected days, during the summer of 1981. They were used in conjunction with net radiation and heat storage measurements to determine evaporation from the surface. Substitution of evaporation values and wind speed data into a rearranged form of the combination model allowed hourly estimates of surface resistance to be made. These were compared with diffusion porometer measurements of leaf resistances from different tree species. The latter indicate a slight tendency to increase over the daylight period, and an order of magnitude difference between the most- and least-resistance species. Differences between Bowen ratio estimates obtained simultaneously at different heights above the canopy are noted as a cause for concern.

SURFACE CONTROL OF AGRICULTURAL CROP AND FOREST EVAPORATION

W.G. Bailey

Differences in evaporation regimes for selected agricultural crop and forest surfaces are presented. A simplified form of the combination model for hourly evaporation estimation is derived and applied. Its application to forest locales is aided by the strong relationship that bulk stomatal resistance shows with soil moisture and vapour-pressure deficit. Bulk stomatal resistance in agricultural crops is shown to be highly dependent on soil moisture availability but many other factors also play important roles in controlling stomatal response. The inability to fully account for such influences hampers short-term evaporation estimation for crop surfaces.

DETERMINATION OF THE EFFECTS OF THE SPOTTED TENTIFORM LEAFMINER ON NET PHOTOSYNTHESIS OF APPLE LEAVES

William J. Blackburn, John T.A. Proctor and Jody M. Bodnar

The spotted tentiform leafminer, *Phyllonorycter blancardella* (F.) has become a major pest in most apple growing regions of the world including Canada. The objective of this study was to examine the effects of spotted tentiform leafminer injury on apple leaf photosynthesis to help define an economic threshold for this pest. Different insect populations were introduced to caged, greenhouse-grown, "Delicious" apple trees so that different levels of insect injury would result. Measurements of net photosynthesis were made using an open-system leaf chamber under a range of light intensities on control leaves (0 mines) and leaves with 3, 7, 10 and 20 mines per leaf. For an average leaf size of 33.41 cm² and an average mine size of 0.55 cm², the photosynthetic rate was reduced by up to 25% for 20 mines per leaf. In addition, the model described by Watson et al. (1978) was used to calculate net photosynthesis at different light intensities for the various degrees of insect injury using a non-linear regression approach. Model estimates were found to agree well with those measured in the laboratory.

USING DEGREE-DAYS TO PREDICT THE OCCURRENCE OF APPLE SCAB INFECTION

William J. Blackburn, John T.A. Proctor and T.J. Gillespie

Apple scab (*Venturia inaequalis* Cke. (Wint.)) is the major pest problem of Ontario's apple industry. The fungus matures as it overwinters in the leaf litter on the orchard floor. In the spring, ascospores are discharged under favourable temperature and moisture conditions and are carried by turbulence to infect the new foliage. At present, the early season forecasting system in Ontario for controlling primary infection is labour intensive and relies heavily on fungicides.

This study was aimed at modifying this scheme by defining some of the interrelationships between biological development and the environment. Predictive equations incorporating degree-days, with base 0 and 5°C were developed and tested using current and historical biological and meteorological data. Results suggest that comparative degree-day accumulations between years and locations should be computed between the occurrence of specific biological events and not between fixed calendar dates using base 0°C. The strengths and weaknesses of several degree-day approaches will be evaluated.

TRANSFER OF SMALL PARTICLE POLLUTANTS TO PINE FOLIAGE AND LICHENS

Peter H. Schuepp

The role of vegetation as an absorbing or filtering agent for small natural and artificial particle pollutants is not well understood, particularly at very small air-flow velocities where impaction is negligible.

Mass transfer to small clusters of pine foliage and lichens was studied by electrochemical simulation at Schmidt numbers comparable to those of small aerosol particles in air. Conceptual and mathematical models for the description of such transfer processes will be discussed.

SOIL WATER AND FREEZE/THAW PROCESS OBSERVATIONS USING TIME DOMAIN REFLECTOMETRY

H.N. Hayhoe, W.G. Bailey, G.C. Topp and K.D. White

Time domain reflectometry (TDR) measures soil water by making use of the dielectric properties of water in soils. Application of TDR to the study of soil water beneath bare and snow-covered sites from the fall of 1980 to the spring of 1981 in Ottawa is described. Results highlight the usefulness of the technique in the study of the changes in liquid water content of the soil throughout the winter. In addition, valuable insight into freeze/thaw processes during early spring conditions was gained. The potential of the TDR to locate the interface between frozen and unfrozen zones as well as monitoring the infiltration of snowmelt is documented.

CO₂ FLUX MEASUREMENTS FROM AIRCRAFT - AN UPDATE

P. Alvo, R.L. Desjardins, E.J. Brach and P.H. Schuepp

In 1980 the first flight tests of an airborne observation system of CO₂ fluxes by eddy correlation were

carried out over corn fields, forests and water in the Ottawa Valley region. Preliminary analysis indicated feasibility and sensitivity of the technique and first data were reported at the 1981 CMOS meeting.

Results from the completed analysis of those data, as well as from additional data obtained in 1981, will be presented. They show that a full evaluation of the potential of the technique will require more systematic comparison between ground-based and airborne data and a better understanding of the variability in space and time of the boundary-layer structure over fields of limited fetch.

Session 4A Icebergs

Thurs. 1300-1445

THE DETECTION OF ICEBERGS IN A SEA-ICE BACKGROUND USING AES SLAR

D. Lapp

The detection of icebergs on a routine operational basis is likely to become part of the AES Ice Branch mandate for ice reconnaissance and forecasting services. This study has examined the performance of the SLAR in identifying icebergs in a sea-ice matrix, considered to be a different problem from that of detecting icebergs in open water.

Identification of icebergs in sea ice on SLAR depends upon system parameters, target and background characteristics as well as operational considerations. System parameters investigated included depression angle, aspect angle, scale and resolution. Important target and background characteristics include iceberg size and shape, as well as the proximity of icebergs to other features such as ridges, leads, islands and other bergs. Perhaps most important for berg identification on a routine basis are the operational considerations, most notably the interpreter and the SLAR operator.

A STUDY OF LONG-TERM SATELLITE-TRACKED ICEBERG DRIFT IN BAFFIN BAY AND DAVIS STRAIT

J.R. Marko, J.R. Birch and M. Wilson

As part of the Petro-Canada/EAMES environmental studies, the trajectories of twenty-one icebergs were recorded in western Baffin Bay and Davis Strait using the Nimbus and Tiros satellite positioning systems. The resulting data indicated a tendency for bergs to follow the rapid flowing core of the southerly Baffin Current, which parallels the contours of the bottom topography over the steep portions of the continental slope. Significant deviations from the overall southerly drift trend were noted, corresponding to intrusions in eastern Lancaster Sound and over several large submarine canyons that cross the continental shelf of the eastern coast of Baffin Island. The latter diversions appear to be the major mechanisms for bringing bergs into water shallow enough to allow groundings and entrapment by subsequent growth of the landfast ice zone. Studies of individual berg immobilization events indicated that the greater portion of a berg's north-to-south travel time is spent within the landfast ice. Exceptionally rapid net drifts appear to be associated with bergs that were located seaward of the landfast zone at the end of the late summer-early fall period of ice-free coastal conditions. Data on berg residence times suggests the average duration of berg drift between Lancaster Sound and Hudson Strait may be in excess of three years.

ICEBERG DISTRIBUTION ALONG THE LABRADOR COAST AS DETERMINED BY SIDE LOOKING AIRBORNE RADAR

H.G. Hengeveld and D. Mudry

During the summer and fall of 1981, a series of monthly SLAR flights was undertaken along the Labrador Coast to determine the distribution of icebergs in the Labrador Sea. The analysis of these data, as well as analysis of SLAR data collected over this area during the winter and spring seasons between 1978 and 1981 has provided an initial data base for evaluation of population distribution and seasonal variations. The paper will present the results of analysis of this data base.

THE EFFECT OF AVERAGING PERIOD ON ICEBERG VELOCITY

L.M. Wilson

Iceberg and ice floe speeds are necessary components of offshore engineering off Canada's East Coast. These data are often available as daily speeds averaged over 24-h periods. Instantaneous speed data, averaged over a much shorter time period are required for engineering applications but are seldom available. From a study of iceberg observations it is possible to calculate the effect of averaging period on the apparent iceberg speed. Data are presented for thirty icebergs for which the speeds are calculated for averaging periods of 1, 2, 3, 4, 5, 6, 7, 8, 12 and 24 h. Relative speed ratios for different averaging periods and their variation are calculated and presented. The relationships among these ratios are investigated and the strongest of these noted.

ESTIMATION OF ICEBERG VOLUME BY AERIAL PHOTOGRAMMETRY

E. Krakowski, E. Leavitt and W. Spring

Under contract to Mobil Research and Development Corporation, INTERA conducted three aerial reconnaissance missions in the spring of 1981 to photograph icebergs in stereo. A total of 92 icebergs were photographed off the east coast of Newfoundland and Labrador. This paper describes the technique used to estimate the iceberg volume and presents one iceberg as an example. Icebergs were contoured at one-metre intervals and digitized. A computer model transformed the data to a grid system and estimated above-water volume. Total volumes were calculated by application of Archimedes Principle. The maximum height, length, width, waterline area and above-water centre of gravity were also computed. Based on previous studies, keel depths were estimated. These proved to vary substantially and tended to exceed charted water depths. Various errors in the volume calculation were identified. The greatest error was attributed to the aircraft altitude. Recommendations for future reconnaissance are discussed.

STATISTICAL MODELLING TECHNIQUES FOR ICEBERG MOTION IN WEST BAFFIN BAY

D.S. Davison and R. McKenna

A statistical modelling procedure was developed for iceberg motions in the west Baffin Bay and Lancaster Sound region. The historical trajectories are modified by auto-correlations with an iceberg's previous motion history, and by cross-correlations with motions of recent icebergs in the same region. This technique is independent of forcing functions and requires as input only a time series of iceberg motion. The technique is complementary to a simultaneous deterministic solution based upon estimates of iceberg characteristics and of the forcing functions. The success of a statistical correlation technique depends upon the level of persistence and on the number density of recent iceberg trajectories, which enable the cross-correlations to remain at sufficiently high levels.

In the west Baffin Bay and Lancaster Sound region, a comparison was made of the integral time and space scales for the Lagrangian iceberg motions and the Eulerian ocean current values. The data showed that Eulerian time scales were greater than the Lagrangian time scales. The implications were that ocean current eddies should not be viewed as typical turbulent eddies in a mean transport current, but rather as transient, geographically restricted fluctuations. Consequently, the cross-correlations with motion of recent icebergs in the vicinity was a better predictor of iceberg motion than auto-correlations.

Session 4B

LRTAP Models

Thurs. 1300-1445

TRAJECTORIES OF AIR PARCELS REACHING QUÉBEC IN 1978

Gilles Desautels

The report analyses the back trajectories converging on six Québec locations for 1978. The average back trajectory distance is greater for stations located in southern Québec by 10 to 20% compared with those in northern Québec. At less than 48 h from impact, trajectories from the W and WNW predominate, while for the longer ranges from 48 to 96 h, the NW and NNW sectors are the most common. The report concludes that the information supplied by wind roses is of no use in identifying the distant origins of air parcels. An examination of annual data shows similarities in behaviour between all stations. However, an examination of seasonal data shows considerable differences, which become even more pronounced when precipitation

days are separated from dry days. Taking into consideration the geographical distribution of sources of pollution-creating acid precipitation, the study reveals that central and northern Québec suffers less exposure than the southern part of the province does, and that all areas experience the greatest exposure in summer.

EVALUATION OF THE ACCURACY OF TRAJECTORY MODELS FOR LONG-RANGE TRANSPORT OF ATMOSPHERIC POLLUTANTS

John L. Walmsley and Jocelyn Mailhot

A method for derivation of non-divergent wind fields from stream functions that are dependent on latitude and longitude is described. Appropriate choice of seven adjustable parameters enables fairly realistic simulation of frictionless flow. The differential equations for trajectories in these analytically specified flows are solved numerically with a high degree of accuracy, giving a standard against which results from trajectory models may be compared. This method is used to evaluate the accuracy of trajectory models for Long-Range Transport of Atmospheric Pollutants (LRTAP).

Theoretical estimates suggest that an important source of error in LRTAP trajectory models is *horizontal* interpolation of wind data. This error is significantly reduced through use of a cubic interpolation scheme. Theory also indicates that truncation error in the trajectory equation can be made almost negligible in comparison with observational errors by using a "constant acceleration" scheme. A linear scheme for *temporal* interpolation of wind data is shown to be sufficiently accurate, when observational and horizontal interpolation errors are considered. Likewise, an assumption of constant map-scale factor during each time step is shown to give errors that are negligible except in cases of strong meridional circulation.

An example of an application of the method to a trajectory model is used to confirm the theoretical conclusions regarding horizontal interpolation of wind data.

TRANSFER MATRICES FROM THE AES-LRT MODEL

M.P. Olson, E.C. Voldner and K.K. Oikawa

THE AES Long-Range Transport Model has been used in the Canada-United States Memorandum of Intent program to compute transfer matrices in an attempt to quantify the source-receptor relationships between emission regions and selected receptor sites. Four-day backward trajectories were computed from the sites for the year 1978 at a height of about 600 m (925 mb). The Lagrangian concentration/deposition model computed sulphur concentrations and depositions at the 9 receptors using a seasonal emissions inventory with 15 Canadian and 25 United States emissions regions. The model used linear chemistry, dry deposition velocities, wet scavenging ratios and a numerical integration scheme using a trapezoidal rule formulation.

The model was run using each emission region in turn to generate the elements of the 40×9 source-receptor matrices. The matrices show that the greatest impact on a receptor usually occurs from the emissions close to the receptor. In addition, the matrices show the ranking of decreasing impact from all emissions regions at all the receptors. Percentage contributions of each emission region at each receptor can be calculated as well as overall Canadian and U.S. percentage contributions.

These matrices are a first attempt at linearly quantifying source-receptor relationships and still have unspecified uncertainties associated with them.

SHORT-RANGE DEPOSITION AND LONG-RANGE TRANSPORT OF AIR POLLUTION

John D. Reid

Numerical models used to assess long-range transport of air pollution and acid rain by necessity adopt simplifying assumptions to make computations tractable. Typically these assumptions are of limited validity in the near-source region, within the source grid square or first computational time step, and empirical adjustments need to be introduced to improve the accounting near the source.

The present study presents estimates of the error resulting from two major assumptions. Firstly, the assumption that all pollution is emitted into a surface based mixed layer is evaluated for some major Ontario industrial sources. For example, for the Ontario Hydro Lambton generating station preliminary calcula-

tions suggest emissions occur above the mixed layer about one-third of the time. Secondly, the assumption that pollutant is uniformly mixed within the layer is evaluated for elevated sources of dry and wet deposition. Preliminary calculations indicate that the uniform mixing assumption significantly overestimates SO_2 deposition near the source for emissions near the top of the mixed layer and provides significant underestimates for emissions near the surface. Deposition of sulphate, which is small, does not appear to be as significantly influenced by the second assumption.

These effects are quantified and suggestions for improved allowances for effects in LRT Concentration/Deposition models are given.

AN INVESTIGATION OF THE ASSUMPTIONS OF LINEAR CHEMISTRY AND SUPERPOSITION IN LRTAP MODELS

R.W. Shaw and J.W.S. Young

Most current LRTAP models that predict the relationship between sulphur emissions and acidic concentrations assume linear chemistry and the ability to superpose concentrations from different sources. This paper will examine, using a non-linear chemistry model, the validity of these two assumptions by looking at downstream concentrations and reaction rates of all relevant chemical species. A control scenario of a 50% reduction in sulphur and/or nitrogen emissions in Ohio and its impact on the Adirondacks and Nova Scotia will be examined. Initial results indicate that the assumption of linearity, i.e. that changes in concentrations are proportional to changes in emissions, may be valid provided that only sulphur and not nitrogen emissions are changed. The model will also be used to attempt to explain changes in precipitation quality during the past 25 years.

THE FORMATION OF THE AQRB/RPN LRTAP EULERIAN MODELLING PROJECT

David Davies

Two Research Branches of the Atmospheric Environment Service have collaborated to establish a joint project to model the long-range transport of air-borne pollutants (LRTAP) using an Eulerian approach. The Air Quality Research Branch (AQRB) provides input on the air quality side, and RPN contributes the numerical modelling expertise.

A detailed five-year plan was completed in December 1981.

The three main objectives are:

- i) To compute a time series of source-receptor relationships on an annual, seasonal and monthly basis for historical meteorological data and actual or contemplated emission scenarios, to support the development of strategic air quality control legislation.
- ii) To make high-pollution episode studies in a post-analysis mode to further the scientific understanding of the underlying phenomena.
- iii) To compute atmospheric concentrations and depositions of pollutants in predictive mode in real-time to support the development of tactical air quality control legislation.

These objectives will be attained by establishing a highly flexible logical framework for performing modelling studies. The scientific aspects of the whole enterprise have been examined from the point of view of their feasibility. All technical options that might conceivably be required within a five-year time frame are precisely listed in an "Option Bank". Technical implementation will take place in three phases. The basic modelling framework will be established in Phase I. About a dozen improvements to the Phase I model will be developed independently in Phase II. The resulting Phase II model will then be further improved in the same way in Phase III. With existing resources, Phase I will be completed in about two years, and Phase II in five years.

Critics of the Lagrangian modelling of LRTAP that has been carried out in recent years have focused attention on the lack of information concerning the reliability of numerical results, and the inability to track pollutants with non-linear chemistry. Accordingly, the Eulerian modelling plan makes provision for estimating the uncertainty of the results as part of the modelling procedure, and for the labelling of pollutants from particular sources.

UNE DISCRÉTISATION VERTICALE CONSERVATIVE PAR ÉLÉMENTS FINIS DANS LE MODÈLE SPECTRAL DU CMC

Claude Girard

Une étude est faite des propriétés de la méthode aux éléments finis en relation avec la conservation de la masse, du moment angulaire et de l'énergie totale dans leur application particulière à la discrétisation verticale des équations primitives. Comme exemple et première application de la méthode, des fonctions de base formées de polynômes constants par morceaux sont introduites dans le modèle spectral présentement en exploitation au CMC. La ressemblance de cette formulation avec celle aux différences finies utilisées dans les modèles de ECMWF permet d'affirmer qu'elle sera bien adaptée à la réalisation de prévisions à moyennes échéances envisagées pour 1984 au CMC.

LES ÉCHANGES AVEC LE SOL DANS LE MODÈLE SPECTRAL

Yves Delage

Depuis le début de 1979 les prévisions numériques au Canada sont produites par un modèle qui comprend l'ensemble des processus physiques agissant sur l'atmosphère à l'échelle synoptique, en particulier le rayonnement avec nuages interactifs et les échanges avec le sol. Un système d'une telle complexité a cependant ses exigences; pour reproduire avec un minimum de réalisme le cycle diurne, le modèle a besoin de plusieurs paramètres régissant les échanges thermiques avec la surface, soit l'albédo, la conductivité et l'humidité du sol, la température dans le sol et la présence de neige au sol ou de glace sur l'eau. Nous montrons comment ces paramètres sont spécifiés pour le modèle spectral et quel est leur effet sur les prévisions de température. Sans remettre en question la nécessité d'une modélisation totale de l'atmosphère, on fait le bilan ici de cette expérience de pionnier réalisée à RPN durant les dernières années.

PARAMÉTRISATION DES NUAGES DANS UN MODÈLE DE PRÉVISION

Louis Garand

Ayant réalisé une analyse numérique des nuages bas et de la couverture nuageuse totale, nous cherchons la relation appropriée entre la couverture nuageuse d'une part et l'humidité et le mouvement vertical d'autre part. D'autres paramètres entrent en jeu comme le type de nuages et leur hauteur. Extérieurement à la physique du phénomène de création de nuages qui, si elle était connue, pourrait conduire à une relation à caractère universel, la relation cherchée devra être conçue pour un type de modèle de prévision donné. Cela tient du fait que l'humidité prévue à l'échelle de la maille d'un modèle n'atteint que très rarement les 100% et sera en fait d'autant plus faible en moyenne que la maille est plus grande.

LES ERREURS SYSTÉMATIQUES DES PRÉVISIONS NUMÉRIQUES DU CENTRE MÉTÉOROLOGIQUE CANADIEN (CMC)

Clément Chouinard

La domaine de la prévision numérique a franchi des étapes importantes récemment, et on peut dire qu'en général les prévisions faites à partir de modèles numériques sont nettement supérieures à ce qu'elles étaient il y a dix ans. Par contre le niveau d'erreur associé à ces prévisions reste assez élevé et une composante importante de l'erreur se répète régulièrement d'une prévision à l'autre c'est à dire indépendamment des conditions initiales. C'est le problème des erreurs systématiques.

Nous au RPN sommes conscients de ce problème et de son importance, c'est pourquoi nous avons mis sur pieds un système de vérifications assez détaillé qui nous a permis d'étudier le comportement spatio-temporel de chacune des prévisions numériques produites au jour le jour par le CMC. On y présente des cartes hémisphériques de l'erreur moyenne saisonnière et ce aux deux niveaux de 50 et 100 kPa. À l'aide de diagrammes Hovmöller on y présente plus en détails le comportement temporel de l'erreur tel que vu dans un ensemble de prévisions de 5 jours. Finalement on y compare notre modèle face à d'autres modèles utilisés en prévision numérique et on y discute brièvement des travaux futurs au RPN quant au problème des erreurs systématiques.

RECENT DEVELOPMENTS IN OBJECTIVE ANALYSIS AT THE CANADIAN METEOROLOGICAL CENTRE

Donald Shantz

The Operational Objective Analysis Program at CMC will be described emphasizing recent developments. The effects of a new Spectral Model including non-linear normal mode initialization will be discussed as well as changes in the method of evaluating statistics used in the analysis program.

Future plans for Objective Analysis at CMC will be presented.

IMPACT STUDY OF DIRECT ASSIMILATION OF RADIANCE DATA FROM SATELLITES ON THE ANALYSIS OF THE ATMOSPHERE

Evhen Yakimiw

Impact studies on the analysis of the atmosphere using SATEM data are fairly numerous. No one has ever tried to use the SARAD's directly. The multivariate optimum interpolation scheme used in the objective analysis at RPN is well suited for directly assimilating radiance data obtained from satellites. We shall present the results of such an assimilation of radiance data received from TIROS-N and NOAA-6 between the 7th and the 20th of October, 1980.

THE DYNAMICAL EQUATIONS IN TURBULENT FLOW

Douglas M. Leahey

Classical atmospheric dynamics is based upon the application of Newton's second law of motion to a parcel of air. The resulting "equations of motion" are predicated on the assumption that the parcel maintains its integrity and never collides with other parcels. This means that the atmosphere is assumed to be non-diffusive and non-convergent. It is common practice to then combine the equations with others that are purported to represent atmospheric diffusion and converging processes. Resulting dynamic atmospheric models, because they violate the law of non-contradiction, cannot represent reality.

This paper illustrates with examples taken from elementary physics and current literature why the "sophisticated" dynamic models employed by weather forecast services have failed so miserably to provide reliable results.

An alternative to the dynamical approach to forecasting is proposed.

Poster Session

Thurs. 1445-1600

Poster 1

GULF OF ST LAWRENCE SEA-ICE ANALYSIS USING NIMBUS-7 SMMR DATA

Anne E. Owens, René O. Ramseier, Frank E. Bunn and Frank W. Thirkettle

NASA launched its NIMBUS-7 satellite in October of 1978. One of the sensors on board is the Scanning Multichannel Microwave Radiometer (SMMR), which measures the microwave emission of the earth's surface. These data have been found to be very useful in the study of sea ice. This paper will describe some of the results of an analysis performed on the Gulf of St Lawrence for February 19, 1979 using SMMR data. An automatic computerized mapping technique was used to depict the geographic characteristics of the area as well as the satellite orbit data. A linear modelling thin ice algorithm was then used to convert these data into sea-ice concentrations, which were also mapped out so that concentration contours could be constructed. The results of this effort were very encouraging and will be presented in this paper. Comparisons with Atmospheric Environment Service ice charts and airborne radar (SLAR) imagery were excellent, especially for the location of the ice edge between Newfoundland and Nova Scotia, therefore making these comparisons noteworthy. The existence of rare ice along the southern shore of Newfoundland

will also be noted. In addition to these results, effects of sea state and cloud conditions on the satellite microwave emission values (brightness temperatures) will be discussed.

Poster 2

ANALYSIS OF MULTI-STAGE, MULTI-DATE IMAGERY OF SEA ICE IN VISCOUNT MELVILLE SOUND, N.W.T.

Alan R. Sneyd and Bharat Dixit

Fenco Consultants Ltd, under contract to the Arctic Pilot Project, (A.P.P.), conducted an intensive ice remote-sensing programme in part of Viscount Melville Sound in May 1981. This programme included the acquisition, interpretation and analysis of two different forms of image product data. RC-8 panchromatic air photos were flown concurrent with the field programme in May 1981 using a Twin Otter. Side looking airborne radar (SLAR) imagery was obtained from an earlier A.P.P. remote-sensing data acquisition and analysis programme. The SLAR data were acquired for Viscount Melville Sound on April 14, 1981, utilizing the Atmospheric Environment Service ice reconnaissance *Electra* aircraft.

The main objective in analysing these forms of image data was to provide a comprehensive record of the ice regime in Viscount Melville Sound between 102 and 106°W, south of 75°N. In addition, a multi-year floe size analysis and ridge size and frequency analysis were conducted.

The SLAR products reproduced for this presentation are at a scale of 1:500,000. The RC-8 panchromatic photos were acquired at a scale of 1:16,000. The photo enlargements included in this presentation were produced at a scale of 1:4,000 to present in more detail the subtle variations in surficial characteristics of first-year and multi-year ice, ridges, hummocks and rubble fields.

A ridge frequency and distribution analysis was performed on one photo line of 94 photos. In total, 211 ridges, or 1.8 ridges per kilometre, were identified as intersecting a line of section through the centre of the photos over a 120-km distance. A multi-year floe size analysis was conducted on a single photo line to provide a sample of floe sizes likely to be encountered in Viscount Melville Sound. The results indicate that 65.3 per cent of these floes are between 100 and 500 m in diameter.

The remote sensing programme provided a comprehensive view of the ice conditions within Viscount Melville Sound. The analysis of SLAR and RC-8 photos provided much needed information on regional ice types, and on ridge and multi-year floe characteristics. The potential for use of remotely-sensed data programmes in frontier areas where sea ice is present shows great promise.

Poster 3

IN SITU DETERMINATION OF THE THERMAL PROPERTIES OF SEA ICE

Humfrey Melling

Sea ice is a heterogeneous multi-phase material whose major constituents are pure ice, brine, salt crystals and air bubbles. The quantities of brine and air trapped in a layer within sea ice depend on the conditions during the formation of that layer and on its age, while the concentration of the brine, its chemical composition and the presence of salts depend on its temperature. The acquisition of samples of sea ice intact for thermal testing is very difficult because of the large scale of spatial organization within the ice (~1 m) and the loss of brine from internal drainage networks during removal of the sample.

A method has been developed for determination of the thermal diffusivity of sea ice using temperature-time sequences from arrays of thermistors frozen into the ice sheet. The method relies on the presence of thermal waves in the ice produced by changing meteorological conditions. If the vertical flux of heat in the ice is known at any point, the thermal conductivity and specific heat and their temperature dependencies may also be derived.

Analysis of data obtained in thick first-year ice shows that the thermal diffusivity is strongly dependent on temperature, and that large changes are found near the temperatures of crystallization of various hydrated salts.

Poster 4

VARIABILITY OF ICE FLOE MOTION IN LANCASTER SOUND AND WESTERN BAFFIN BAY

D.M. Nazarenko and D.E. Pearson

Utilizing LANDSAT data, successive images were reviewed to study ice floe motion in eastern Lancaster Sound and northwestern Baffin Bay. Polar satellites experience convergence of orbital tracks at high latitudes resulting in greater sidelp between images. This allows comparison of the same area over successive days. Six years of data (1974-1980) were analysed to document historical ice conditions, ice-floe trajectories and motion.

Motion vectors for all re-identifiable individual ice floes were calculated to demonstrate the variability of localized floe motions. These vectors were later compared with those obtained for composite ice features to examine the effect of floe interaction on floe kinematics. A statistical analysis of available meteorological and oceanographic data was conducted in an attempt to prioritize their importance over short-term periods.

Poster 5

SUMMER DISTRIBUTION OF ICEBERGS AND SEA ICE IN NORTHWESTERN BAFFIN BAY AND LANCASTER SOUND

D.E. Pearson

Historical SLAR (side looking airborne radar) imagery collected in northwestern Baffin Bay and Lancaster Sound during the summers of 1978 and 1979 were interpreted to determine the existence of temporal and spatial trends of sea ice and iceberg presence. Sixty SLAR images of the study area, comprising 319 grid squares of 150 km² each, were analysed for ice floe dimensions and iceberg densities. The data were subsequently merged for two seasonal periods (May 1-July 31 and August 1-October 31) to provide a summary of the seasonal distribution of sea ice and icebergs. Thematic maps were generated depicting iceberg density and mean ice floe area variations within the study area.

The resulting distributions are presented and significant trends identified. These interpretations and their relation to our current understanding of meteorological conditions, current circulation and bathymetry of the study area are presented.

Poster 6

ALBEDO SURVEY AND SIMULATION FOR ANDREI GLACIER, B.C., MID-SUMMER, 1980

S. Fogarasi

Current aerial photographs of Andrei Glacier, B.C., were obtained and subjected to densitometric examination that revealed four brightness groups on the ice. Albedo measurements were also carried out at nine sites of variously contaminated ice surfaces of the glacier. Four albedo classes were derived in terms of the amount of aeolian dirt that was deposited on the ice surface. Each albedo class was associated with one of the white, whitish, dirty, and very dirty surfaces and each class had significantly different albedos whose means ranged from 22 to 68%.

Values in each albedo group were tested with "Geary's Ratio" and the skewness and the data were found normally distributed over time. Albedos from wet ice surfaces were between the -2 and -3 standard deviation band of each albedo-class distribution. Albedo values measured on freshly frozen ice surfaces tended to occupy the upper tail of the Gaussian distribution, i.e. between 2 and 3 standard deviations.

Albedo values were tabulated and plotted along a grid of 500-m mesh. Finally, a computer program is shown which can be used to simulate hourly ice and snow albedo distribution over the glacier.

Poster 7

FORECAST SUPPORT TO OIL EXPLORATION IN THE SOUTHERN BEAUFORT SEA

E.T. Hudson and W.D. Hume

The Atmospheric Environment Service has been providing forecast support to petroleum exploration

activity in the Beaufort Sea since 1976. A 24-h forecast and warning service, including weather elements, sea state and ice motion is provided by the Beaufort Weather and Ice Office located in the Dome Petroleum base camp at Tuktoyaktuk, NWT. Support services are provided by Forecast Operations Division of Western Region in Edmonton and Ice Branch in Toronto and Ottawa.

The poster session presentation will focus on the details of the forecast service provided, the use made of special data sets including ice reconnaissance (visual, SAR, SLAR), satellite imagery and DCP data and the other consultation services provided by the Office to the many industry and government agencies active in the Tuktoyaktuk area.

Poster 8

SURFACE SHEAR STRESS AND SURFACE CURRENTS ON LOWER BASS LAKE

Ellsworth F. LeDrew and Peter D. Reid

The surface currents of Lower Bass Lake at the Chalk River Nuclear Laboratories were studied for twenty-two episodes in June of 1981. Drifting buoys were tracked by survey triangulation and micrometeorological data were collected at the centre of this small lake (0.11 km²). For one episode, thermal imagery of the lake was collected and aerial photographs were made from a helicopter platform.

The limited literature reports a predominance of counterclockwise curl to the surface currents for lakes in the Northern Hemisphere. The explanation involves the Ekman drift of surface warm water to the right of the wind trajectory, the associated increased atmospheric instability and increased coupling of atmospheric momentum to the surface with resultant increased surface current velocity. In our case, the temperature variations across the lake surface are sufficient to cause significant spatial differences in shear stress. Curl of the surface currents is observed, but in both counterclockwise and clockwise directions.

Poster 9

THE TOPOGRAPHIC INFLUENCE OF THE LIUPAN MOUNTAIN RANGE ON THE HAIL PROCESS IN THE PINGLIANG DISTRICT OF CHINA

Qu Zhang and others

Since 1972, we have been undertaking research work on hail in the Pingliang District in the eastern foothills of the Liupan Mountains on the northeastern part of the Tibet Plateau.

A. The frequency of occurrence of intense echo in thunderstorm cloud (including hail cloud) and the echo path of hail cloud.

We have counted statistically the times and the frequencies of occurrence of intense echoes in the years 1973-1978. We obtained two belts of relative maximum frequency for thunderstorm clouds. One of the belts is nearest to the mountain range within a distance of 10 km.

The secondary intense echo and hail belts lie downstream of the Liupan Mountain range at a distance of 30 km, but an intense hail zone also lies downstream of the former belt at a distance of 30 km. From these results, we cannot but conclude that this phenomenon is correlated with the influence of the Liupan Mountain Range.

B. The influence of the Liupan Mountain Range upon the synoptic system.

A case study was also made of the topographic influence of the Liupan Mountain Range on a synoptic system whenever a squall line moved from northwest to southeast over the Range. The maximum time lag between the mountain range and its two sides within a distance of 100 km and at the same latitude may approach two hours. The change of the meteorological elements at stations along both sides of the Mountain is very large. The occurrence of the peak value has a time lag from north to south, but there is no lag across the Mountain ridge.

Poster 10

A REVIEW OF CANADIAN INVOLVEMENT IN HIPLEX AND CCOPE AND APPLICATIONS OF THESE PROJECTS TO WEATHER MODIFICATION IN CANADA

Robert S. Schemenauer and J.I. MacPherson

The Cloud Physics Research Division of the Atmospheric Environment Service together with the National Aeronautical Establishment participated in 2 major American field programmes in the last 3 years. The

High Plains Experiment (HIPLEX, 1979, 1980) was a multi-year field programme aimed at establishing the physical basis for enhancing beneficial growing-season precipitation from convective clouds on the high plains. The Cooperative Convective Precipitation Experiment (CCOPE, 1981) was a single season experiment designed to give a better understanding of how precipitation is produced naturally in summer convective clouds with scales ranging from cumulus clouds to thunderstorms and squall lines.

HIPLEX enabled us to: compare the Miles City natural cloud characteristics with those of clouds studied previously in Canadian locations; participate in a state-of-the-art American weather modification programme; and assess the transferability of the technology, procedures and results to Canada. Our CCOPE involvement provides access to aircraft (15), radar (10), mesonet and satellite data concerning the evolution of precipitation in convective systems of all scales.

Though there are differences between clouds at Miles City and those near Yellowknife and Thunder Bay, there are also some marked similarities, particularly in the dimensions and microphysical and turbulence characteristics of Miles City and Yellowknife clouds. The impact of HIPLEX on the possibility of conducting a similar research or operational experiment in Canada must await the final analysis of the HIPLEX seeding results. It appears, though, that the clouds in the HIPLEX project area are sufficiently similar to those encountered previously in Canada, that the procedures and technology employed could be reasonably transferred to certain areas in Canada. No attempt would be considered to duplicate HIPLEX exactly, since some of the procedures were closely linked to the specific aircraft technology used in the programme. Also, while radar coverage plays an essential part in HIPLEX, this might have to be de-emphasized in Canada depending on project location. Existing and future radar locations in Canada are primarily in the south near large population centres. These may not be the best locations for rainfall augmentation programmes.

Poster 11

THE NAE TWIN OTTER ATMOSPHERIC RESEARCH AIRCRAFT

J.I. MacPherson, J.M. Morgan and K. Lum

Twin Otter CF-POK-X has been instrumented by the Flight Research Laboratory of the National Aeronautical Establishment (NAE) principally as an atmospheric research aircraft. Development of its on-board instrumentation began in 1974 when the NAE entered into a cooperative cloud physics programme with the Cloud Physics Research Division of the Atmospheric Environment Service of Canada (AES). Over the last 8 years, this instrumentation and the associated data playback facilities and software have been continually expanded and refined.

The aim of this development programme was to produce a research aircraft well equipped for flight dynamics experiments, as well as to create an atmospheric research platform capable of carrying and supporting other investigators' instruments and experiments. When in the atmospheric studies role, for example, the integration of NAE and AES instrumentation aboard the Twin Otter had made it a recognized state-of-the-art cloud physics aircraft. In such studies the AES measures cloud microphysical data with several laser spectrometers, while the NAE instrumentation computes true atmospheric motion, state parameters, aircraft velocities, position, etc.

This paper will describe the instrumentation aboard the Twin Otter, the data playback facilities, and the software package used for the real-time processing and display of data to the aircrew. The aircraft's capabilities will be illustrated with example data from some of the atmospheric studies in which it has been flown.

Poster 12

THE DEVELOPMENT OF THE ALBERTA RESEARCH AIRCRAFT FACILITY

K.L. Grandia, D.S. Davison and R. Rudolph

In 1981, INTERA Environmental Consultants Ltd and the Alberta Research Council entered into a joint development programme to develop a cloud physics and dynamics research aircraft facility. In the design of this platform, INTERA conducted a review of suitable aircraft to meet the desired specifications. That review led to the selection of the Cessna *Conquest* as the appropriate aircraft for this programme.

Following the selection of the aircraft, a systematic design programme was established for the external sensor selection and placement in the aircraft. Three criteria were to be met as part of this design: (1) the sensors were to sample in as undisturbed flow as possible; (2) the sensor installations were to meet Ministry of Transport (MOT) structural design specifications; and (3) the installations were to have as minimum an impact on the aircraft performance as possible.

As part of satisfying the first criterion, INTERA conducted several numerical simulations and analytical solutions to the flow field to determine the flow distortions around the nose, fuselage, and wing regions of the *Conquest*. In addition, static and dynamic pressure transducers were mounted at several locations in order to verify and document the model results.

A rigorous flight test programme was conducted to document the impact of the sensor placements on the aircraft performance, under various flight regimes and aircraft payloads. The results of these flight tests were incorporated into the MOT Airworthiness Certification for the research configuration of the *Conquest*.

The background and current status of this development programme will be presented, along with the results of the airflow simulation and flight test programmes. Also, the various applications of this facility will be presented, along with results of research projects conducted to date.

Poster 13

INFLUENCE OF SNOW COVER ON SOIL TEMPERATURES IN THE BIOLOGICALLY ACTIVE ZONE

H.N. Hayhoe and L.M. Dwyer

Analysis of the thermal insulation of snow and its effect on soil temperatures in the biologically active zone were carried out using both historical climatological station observations and more detailed experimental data sets. Daily measurements of depth of snow on the ground are first used to explain differences between air temperatures and 5-cm soil temperatures. Hourly air, snow and soil temperatures, from selected periods with a range of snow covers (including a snow cleared site), are then used to provide additional insight into the mechanisms involved in heat flow through the snow pack and soil. This data base is used to quantify heat flows and validate a simplified diffusion-based temperature model. The model is then used to simulate the response of soil temperatures in the top 10 cm of the soil to prolonged sub-zero air temperatures. The need to match data requirements to the scope and detail dictated by the application of soil temperature estimates is discussed.

Poster 14

EVAPOTRANSPIRATION REGIMES IN CANADA

W.G. Bailey

Recent large-area estimations of annual evapotranspiration for Canada are compared with measurements taken in various agricultural and forest environments. The comparison illustrates the consistency between the micrometeorological measurements and the large-area estimations. Equilibrium evaporation is found to provide a good approximation of actual evaporation in many locales and reasons for this are suggested. The results also highlight the limited evaporation data for validating large-area estimations in many of Canada's geographical regions.

Poster 15

POLLINATION ACTIVITY OF THE ALFALFA LEAFCUTTING BEE

H. Lerer, W.G. Bailey and P.F. Mills

A limiting factor in the production of alfalfa seed is the efficiency of the associated insect pollinators, particularly the alfalfa leafcutting bee, *Megachile rotundata*. This report deals with the influence of solar irradiance, air temperature and vapour pressure on the pollination activity of *M. rotundata*. During four warm, cloudless days at Beaverlodge, Alberta, it was found that air temperature established an environmental threshold for the initiation of pollination activity. Once the threshold that occurred between 16–17°C was surpassed, activity was dependent on solar irradiance. Over the limited range of vapour

pressures observed, no relationship between vapour pressure and activity could be discerned. These results have utility in defining optimum insect foraging activity in response to weather conditions.

Poster 16

AUTOMATED WEATHER ELEMENT INPUT TO FOREST FIRE SEVERITY FORECASTING

R.L. Raddatz and G.B. Atkinson

The Fire danger in a forested area results from the complex interaction of many factors that affect the inception, spread, and difficulty of control of fires and the damage they cause. Climate, topography and property values are normally assumed constant while fuel moisture and weather combine to produce short-term fluctuations in the fire danger. Across Canada, the variable factors are monitored by the provincial fire control agencies through the daily calculation of a composite index referred to as the Fire Weather Index (FWI). The FWI provides a scale for rating potential fire severity and is useful for evaluating the total fire danger. Since the FWI is entirely a function of weather, actual and forecast indices may be calculated from observed and predicted values of the appropriate weather elements.

The Atmospheric Environment Service's Central Region provides a service that allows the forest fire control agencies of Manitoba and Saskatchewan to communicate directly with the computer system at the Prairie Weather Centre (PRWC). Direct access, via the Trans-Canada Telephone System's TWX network, was implemented at the start of the 1979 season. The forestry agencies input weather observations and automatically receive actual and forecast FWI values. Beginning in 1980, the subjectively produced weather element forecasts were replaced by surface wind, temperature and relative humidity values automatically derived by a simple procedure using grid-point upper-air data predicted by the Canadian Meteorological Centre's Hemispheric Spectral Model as input. The procedure assumes a well-mixed boundary layer, typical of summer midday conditions. The Forestry Meteorologist scrutinizes these weather element predictions and makes adjustments based on his assessment of their accuracy. Precipitation forecasts must still be subjectively produced.

Verification statistics for the 1980 and 1981 fire weather seasons indicate that the weather element forecasts, produced in the above manner, were correct approximately two-thirds of the time.

Poster 17

SOIL MOISTURE STATUS DURING DROUGHT EVENTS: TWO EXAMPLES FROM THE PRAIRIE PROVINCES

R.B. Street and D.W. McNichol

The Atmospheric Environment Service has been conducting a study designed to objectively identify historical droughts such that logical intercomparison and inferences regarding possible future droughts may be made. For the period 1925-80, prolonged dry spells within the Prairie Provinces are being documented in terms of timing, extent, duration and severity. The primary analysis parameter is the soil moisture determined from a continuous climatic water balance resolved over 10-day periods. Precipitation and temperature data from 120 localities, which have been transformed onto an equal area (10,000 km²) spatial grid consisting of 220 grid points, are the climatic inputs to the water balance.

This presentation examines the behaviour of the soil moisture throughout the Prairie Provinces during the winter drought of 1976-77 and the summer drought of 1980. The actual grid-point soil moistures during these two recent drought periods are compared with long-term normals. A combination of time series and spatial analysis has been used to document and compare these drought periods in terms of timing, extent, duration and severity. Procedures are currently being developed to identify and examine all the droughts during the period 1925-80 on the basis of these descriptors.

Poster 18

THE EFFECT OF CLIMATIC VARIATION ON TREE RINGS OF SPRUCE FROM THE CENTRAL CANADIAN BOREAL FOREST

L.A. Jozsa, M.L. Parker, P.A. Bramhall, S.G. Johnson, J.M. Powell and N.B. Schultz

Tree ring samples were collected from living spruce [*Picea glauca* (Moench) Voss] trees at a number of

sites in Alberta, the Northwest Territories and Manitoba. A total of eight geographical locations were sampled along two south-to-north transects from the southern limit of the Boreal Forest to the open subarctic forest. Fifteen trees were sampled at each site, two cores from each tree, for the primary purpose of studying the effect of climatic variability on tree growth throughout time and space. White spruce was chosen because it has a wide distribution range, its growth is responsive to variations in climate, and it is relatively free from insect epidemics and disease. A minimum stand age of 200 years was sought for two reasons. Firstly, as these trees get older, their growth becomes more sensitive to variations in climate, and secondly, longer chronologies provide a better data base for studying past climates through tree rings. Computerized X-ray densitometry techniques have been used to produce detailed annual ring-width and ring-density chronologies. Individual radial scans were standardized for each sample tree before the building of summary chronologies for each of the eight sites. Ring-width, ring-density, ring-volume, and ring-weight parameters were statistically compared with temperature and precipitation records throughout time and space. Spatial comparisons show the site-to-site differences, going from south-to-north along the two transects. At the northernmost site in Manitoba, black spruce [*Picea mariana* (Mill.) B.S.P.] was compared with white spruce, under identical site conditions, to test the validity of using black spruce in dendrochronological studies in the future.

Poster 19

CANADIAN CLIMATE INFORMATION - THE ATMOSPHERIC ENVIRONMENT SERVICE

Frank D. Manning

Climate data and derived information are useful, and in some cases crucial for those engaged in climate-related activities. This poster session will indicate what climate information, services and products are available from the Atmospheric Environment Service and how they may be obtained. Examples of periodicals, various non-routine publications, and data on microfiche will be on display. Emphasis will be given to recent publications and to publicizing the content and extent of the newly created 1951-80 climate statistics. These statistics required three years to develop, are available on microfiche, in publications or on magnetic tape, and include normals, percentiles and extremes. This session should be of interest to designers, developers, application specialists, planners and in fact anyone who requires climate data whether for design, planning or operational purposes. If space is available some topical climatic maps may also be displayed.

Poster 20

DROUGHT AND DUST ON THE PRAIRIES: U.S.-CANADIAN COMPARISONS

Steve LaDochy and Clarence H. Annett

The common belief that there is more dust in the air during periods of drought than during normal precipitation periods is tested for both the Canadian Prairies and for the central Great Plains of the United States. Total suspended particulate (TSP) data from high-volume samplers are compared to variations in precipitation and other meteorological and non-meteorological data. An in-depth comparison of dust levels is conducted for Winnipeg, Manitoba and Kansas City, Missouri, particularly during the extreme 1976-77 drought in Manitoba and the scorching summer of 1980 in the central United States. The data clearly show that droughts and dry periods do have higher dust levels. But the magnitude of the effects of snow cover and precipitation scavenging on the reduction of dust particles shows marked differences between the two locations.

Continued on page 122

CIRCULATION ON THE NEWFOUNDLAND CONTINENTAL SHELF

B. Petrie and C. Anderson

The prospect of offshore development has increased the need of fisheries, petroleum and environmental agencies for a knowledge of the general circulation of the Newfoundland continental shelf. The work of Smith, Soule and Mosby (1937) stands as the definitive description of the currents in this region. In order to update and quantify their picture, which was based on temperature and salinity data, we have analysed observations made with surface and bottom drifters, current meters, satellite-tracked buoys, sea-level gauges, and ship's drift. In addition, the considerably expanded hydrological data base has been examined.

The dominant flow in the region is the Labrador Current with a transport of $5.3 (\pm 0.44) \times 10^6 \text{ m}^3 \text{ s}^{-1}$ at the southern Labrador Shelf. On the Newfoundland shelf, there are two branches of the current, one through Avalon Channel (inshore) has a transport of $0.6 \times 10^6 \text{ m}^3 \text{ s}^{-1}$, while the offshore component has a transport of $4.1 (\pm 0.28) \times 10^6 \text{ m}^3 \text{ s}^{-1}$ south of Flemish Cap. The data indicate that only 20% of the inshore component moves westward into the Gulf of St Lawrence whereas the bulk of the current moves offshore where it may contribute to the formation of slope water. The observations generally confirm the circulation pattern proposed by Smith, Soule and Mosby.

MEAN AND SEASONAL CIRCULATION OFF CAPE SABLE, NOVA SCOTIA

Peter C. Smith

Sixteen months' records (April 1979–August 1980) from a mooring array off Cape Sable, N.S. reveal a dominant mean circulation pattern characterized by:

- 1) longshore currents ($4\text{--}8 \text{ cm s}^{-1}$) near the coast, i.e. within the 100-m isobath;
- 2) a permanent anticyclonic gyre around Browns Bank;
- 3) onshore flow near the bottom of Cape Sable; and
- 4) offshore/onshore components at bottom/mid-depth off Shelburne, N.S., i.e. upstream on the Scotian Shelf.

Superimposed on the mean circulation are distinctive seasonal effects including:

- a) winter-time enhancement ($3\text{--}5 \text{ cm s}^{-1}$) of flow into the Gulf of Maine off Cape Sable, which extends to the bottom on the 110-m isobath;
- b) significant annual variations of the cross-isobath velocity component near the surface and bottom especially near the coast; and
- c) strong annual cycles in temperature ($3\text{--}5^\circ\text{C}$) and salinity ($0.4\text{--}0.7\text{‰}$) at all sites.

The seasonal temperature variations are governed primarily by solar input, but salinity, which controls density, is governed by advective effects such as a pulse of cold, fresh water that arrives in winter from the Gulf of St Lawrence. The residual velocity field for a two-dimensional tidal model of the Gulf of Maine with a cross-shelf sea surface slope of order 2×10^{-7} compares favourably with the observed pattern of annual mean, vertically-averaged flow, which suggests that tidal rectification may be the dominant driving force for the mean circulation. However, a simple diagnostic model indicates that longshore density gradients play a major role in the seasonal circulation along with a longshore pressure gradient and seasonal atmospheric wind stress.

BOTTOM CURRENTS IN THE CENTRAL BASIN OF LAKE ERIE

F.M. Boyce, M.N. Charlton, G.N. Ivey and K.C. Miners

Recent work has shown that biochemical processes occurring in the hypolimnion of Lake Erie's Central Basin are strongly governed by physical processes such as sediment resuspension and entrainment. Currents, temperatures, dissolved oxygen, and sediment trap measurements were made in the Central Basin during 1979 and 1980. The spatial and temporal variabilities of bottom currents are examined as well as their capacity for resuspension and downward entrainment. A diagnostic model is proposed for the study of the distribution of horizontal currents with depth.

RESPONSE OF THE EASTMAIN RIVER ESTUARY (JAMES BAY) TO FLOW REDUCTION

R.G. Ingram, J.C. Deguise and S. Lepage

In July 1980 the fresh water discharge of the Eastmain River was drastically reduced. Moored current meter results from seven locations within the river and one in James Bay are used to describe the transition and conditions in the following year. Major features noted include upstream salinity intrusion, larger tidal currents and an attenuation and re-orientation of the mean flow. Response time for the circulation was an order of magnitude faster than for salinity.

CURRENT MEASUREMENTS IN GEORGIA STRAIT

T. Yao, S. Pond and L. Mysak

Current, temperature and conductivity were measured with a vertically profiling cyclesonde in the central Strait of Georgia, British Columbia, between February and May, 1981. The profiling range was between 60 and 280 m in 325 m of water. The mean current was eastward, or across strait, and decreased with depth. During the initial part of the observation period, the low-frequency current fluctuations decreased with depth; during the latter part, the current fluctuations displayed a mid-depth maximum. At 60 m the east and north components of current fluctuations were comparable. At depth the fluctuations were aligned in the north-south direction, parallel with the local bathymetry. The displacement of isopycnal surfaces increased with depth. The dominant portion of wind energy was contained in a frequency band corresponding to a period of about 5 days. The dominant portion of subtidal current energy was contained in lower frequencies. There was coherence between the along strait component of wind and the east component of current in the lowest frequency band, corresponding to periods exceeding 15 days.

Session 5B

Cloud Physics

Thurs. 1600-1745

NEW EVIDENCE FOR RAINFALL ENHANCEMENT IN NORTH DAKOTA

Amos G. Eddy and E.R. Reinelt

The results of recent studies lend further support to the claim that cloud seeding in North Dakota produces an increase in precipitation during the growing season. Rainfall reported in and downwind from areas seeded by aircraft dispersing silver iodide during the period 1976-1980 show characteristics significantly different from those of rainfall reported elsewhere in the State. Average rainfall volume increases of about 15% are found during the critical period from June 6 to July 11. Differences in precipitation amount are such that rainfall at stations within the seeded plume is greater than that at stations outside the plume. Moreover, the percentage of reports showing non-zero rainfall is higher within the plume, and the distribution of 24-h rainfall intensities is shifted toward higher values. No significant differences between "seeded" and "non-seeded" rainfall can be discerned beyond 12 h downstream from the seeded areas.

THE REMOTE SENSING OF SUPERCOOLED LIQUID WATER IN CLOUDS USING RADAR DATA

G.L. Austin and O. Massambani

Radar data collected in Spain as part of the PEP experiment using a Russian high sensitivity X band radar and a Canadian digitizer were compared with cloud microphysical data collected by the University of Wyoming microphysical aircraft. A vertical reflectivity profile characterization technique has been developed that shows considerable skill in identifying regions of imbedded convection with significant supercooled liquid water in otherwise stratiform glaciated clouds. The use of this technique in the evaluation of seeding potential is discussed briefly.

PRECIPITATION PROCESSES WITHIN THE ALBERTA HAILSTORM OF 21 JULY 1979

Terrence W. Krauss

An investigation was made into the precipitation processes operating within the convective zone located upwind (with respect to the mid-level winds) of a severe Alberta hailstorm that occurred on 21 July 1979.

The main research tools employed were the University of Wyoming's instrumented Queen-Air aircraft and the Alberta Research Council's S-Band polarization diversity meteorological radar.

The microphysical observations indicate that precipitation-size particles formed as a result of the accretional growth of ice particles, and the first radar echo greater than 20 dBZ was due to 1 to 2 mm-size graupel particles with concentrations from about 0.01 to 0.1 L⁻¹.

A conceptual model was developed for the storm by synthesizing the aircraft data with the radar data. Evidence exists for a two-stage hail growth process: the embryos developed in the feeder clouds and then were transported by the mid-level winds into the WER of the main storm where they grew to large hail along the edges of the main updraft. Feeder clouds that merged with the storm produced fine-scale reflectivity patterns. The transfer of melted graupel particles from the feeder clouds to the WER at levels warmer than 0°C is thought to be a source of frozen drop embryos found within some of the hailstones from this storm.

THE APPLICATION OF A COMPUTER MODEL FOR THE OPTIMAL PLACEMENT OF CLOUD PHYSICS SENSORS ON A RESEARCH AIRCRAFT

M.M. Oleskiw, K.L. Grandia and D.S. Davison

INTERA Environmental Consultants Ltd and the Alberta Research Council (ARC) have entered a joint programme for the development of a Research Aircraft Facility suitable for atmospheric cloud physics and dynamics research. As part of the design phase for the placement of various external sampling sensors, INTERA has conducted modelling studies to determine the extent to which the airflow, and also cloud and water droplet trajectories, are affected by the aircraft profile.

The airflow in the nose region of the aircraft has been modelled in three ways. The first two methods involve the approximation of the nose cone section by parabolas and ellipsoids of revolution. The third technique employs INTERA's Environmental Modelling System to predict the airflow about an arbitrarily shaped, three-dimensional aircraft half-section. This latter model incorporates equations capable of predicting the development of the aircraft boundary layer as well as the potential flow farther from the aircraft surface. Another model has been used to predict the airflow farther back along the fuselage and in the wing region. This program uses a surface vorticity method to simulate the potential flow about a longitudinally symmetric body oriented perpendicular to the flow. The velocities predicted by the above models will be compared with actual flight measurements at several locations for a combination of air speeds and angles of attack.

The air velocities predicted by the above models are used as inputs to calculate the trajectories of cloud and water droplets that pass near the aircraft. Such trajectories are determined through the application of the complete droplet equation of motion. These studies produce the distortion of the droplet trajectories and thus the droplet size spectrum at various locations near the aircraft. By combining these results with the knowledge of the airflow, it is possible to evaluate several potential cloud physics sensor locations to effect the best compromise between engineering considerations and the desire to minimize the effects of the aircraft upon our sampling volume. Furthermore, the model results may be used to compensate for residual distortions.

NUMERICAL SIMULATION OF THE MODIFICATION OF A CUMULUS CLOUD

Xu Hua-ying, Huang Mei-yun, Hao Jing-fu and Li Gui-chen

The numerical simulation of the modification of a cumulus cloud is studied in three ways: raising the temperature, changing the updraft current and seeding with salt particles in the cloud. The two-dimensional time-dependent cumulus cloud model is used in all the numerical experiments. Results can be summarized as follows:

1. If the temperature in the centre of the cloud is raised artificially, the vertical velocity and cloud water content in the seeded cloud are all larger than those in the unmodified cloud, and the lifetime of the cloud and precipitation also increase. The larger the temperature increase is, the larger the effect will be.
2. If the vertical velocity in the central part of the cloud is changed into a downdraft current within a short time, the temperature and vertical velocity in the modified cloud and the precipitation will

increase, since below the modified level there is a convergence region where the water vapour increases and condensation appears. In this case the air will be heated owing to condensation of vapour, so that the temperature will be increased as a result of the modification.

3. By cloud seeding with salt particles, the precipitation and intensity of the radar echoes may be increased. For a given amount of salt seeding, the smaller the salt particles used for seeding, the greater the increase of precipitation. However, the onset of the increased precipitation will be later, so that precipitation can be increased by cloud seeding with salt particles only for cumulus with long lifetimes.

THE DISTRIBUTION OF LARGE CLOUD DROPLETS AND INITIATION OF RAIN IN WARM STRATIFORM CLOUDS

Huang Mei-yun, He Zhen-zhen and Shen Zhi-lai

During June to July in 1979–1980, large droplets and other cloud parameters in stratiform clouds were observed over the Xin An River basin. The concentration distribution and the spectrum of the large droplets as a function of height and kind of cloud have been analysed. The results indicate that: 1) In summer, over the Xin An River basin rain from stratiform cloud is produced mainly by the condensation-coalescence process. The existence of large droplets with a concentration greater than 1 L^{-1} in cloud is the only necessary condition for initiating rain but not a sufficient one. To precipitate, a cloud also requires other physical conditions. 2) In the weather modification experiments, if particles of salt are suitably seeded in stratiform cloud, the chance of natural rainfall could be increased. 3) The convective region, in which there are more large droplets, could play an important role in the production of precipitation from stratocumulus.

FURTHER ANALYSIS OF HAILFALL FROM SUPERCELL HAILSTORMS

Wang Ang-sheng, Xu Nai-zhang and Huang Mei-yun

It has been indicated that a supercell hailstorm is characterized basically by a large cell with an extending "overhang echo", below which there is a "weak echo region"; close to the main body of the echo there is an almost vertical "echo wall". But there is no evidence that all clouds having such structural characteristics are severe hailstorms. Analysis of 30 supercell hailstorms observed in China and other countries indicates that about one-third of supercell hailstorms occur without severe damage or large hailstones. The relation between the structure of hailstorms and the intensity of hailfall was studied, with the following results: 1) A larger range of stronger radar echos is a favourable condition for producing severe hailfall. 2) A deep interjection of the stronger echo region into the natural ice forming regions is another characteristic of a hailstorm with large damage. 3) Severe hailstorms usually appear in the environment with moderate wind shear ($2.5\text{--}4.0 \text{ m s}^{-1} \text{ km}^{-1}$). 4) The lifetime of the circulation with an updraft-downdraft and the intensity of the updraft are closely related to the intensity of hailfall.

Session 5C

Ice Engineering

Thurs. 1600–1715

ICE AND OFFSHORE PRODUCTION ON THE EAST COAST OF CANADA

P.E. Vandall, Jr

The development of production concepts and the design of offshore structures in those areas indicating significant hydrocarbon discoveries on the southeast Baffin Island Shelf, Labrador Shelf and Grand Banks will depend primarily on a knowledge of pack ice and iceberg conditions. A summary is given of our existing knowledge about these ice conditions off the East Coast and an assessment is made about what ice information is still required to develop economically viable production concepts and offshore structures in this area.

THE SIMULATION OF SEA-ICE CONCENTRATION FOR ESTIMATING DRILLING DOWNTIME

I. Stuart Hotzel and John D. Miller

Estimation of drilling downtime caused by drilling problems and impacts of the environment upon the drilling operation is crucial to the assessment of an area for future oil exploration. Petro-Canada Exploration Inc. has examined the possibilities for drilling in an area of Baffin Bay close to the entrance to Lancaster Sound. In order to assess the effects of sea-ice incursion upon the drilling operation a statistical ice cover model was developed and coupled with a drilling/environment interaction model. The sea-ice model is based on an ice/ship impact model originally proposed by Bradford (1971) and modified by the authors. The ice impact model reflects the additive effects of new ice, first-year ice and multi-year ice on exploratory drilling activities. The model appears to accurately represent the progression of ice conditions during the drilling season and more accurately show the relative effects of ice type on the drilling programme than simple ice cover models in which ice concentration is the parameter considered to be most important to the drilling operations.

OPTIMAL PLATFORM STRENGTH IN THE PRESENCE OF MOVING ICE

E.G. Enns, B.R. Smith and P.F. Ehlers

Ice floes and bergs moving in a sea containing a stationary platform pose an obvious hazard to this structure. The time between collisions with floes of specified size is determined for arbitrary distributions of floe size and velocity. The cost tradeoffs involved would be the amount of money spent on strengthening the platform to withstand the impact of floes of a certain size versus having to move the platform whenever floes of a critical size approach. Graphical results will be presented for various platform cost functions.

THE DEVELOPMENT OF CRYSTALLOGRAPHIC PREFERRED ORIENTATIONS IN SEA ICE - A REVIEW AND AN OUTLINE FOR FURTHER WORK

Ed Stander

Sea ice commonly consists of three distinct layers, an upper layer, a central or transient layer, and a bottom layer; of these the upper layer consists of small crystals with vertical to randomly oriented c-axes, while the transition zone consists of columnar crystals whose c-axes are randomly distributed in the horizontal plane. Bottom ice is similar in character to the transition zone ice but exhibits a crystallographic fabric in which the c-axes are preferentially aligned within the horizontal plane.

While most workers agree that the changeover from upper to centre ice occurs by the wedging out of unfavourably oriented grains, the processes involved in the development of bottom ice are less certain. This is unfortunate, since many of the physical properties of sea-ice sheets depend upon the degree of orientation present in this bottom layer.

There are two hypotheses presently available to explain the development of bottom ice: the selective growth hypothesis and the stress reorienting hypothesis. In the first process, crystallographic alignment occurs by the preferred growth of crystals whose basal planes lie perpendicular to the predominant current direction. Since the c-axis in ice lies normal to the basal planes, this produces a c-axis point maximum that parallels the current direction. In the strain reorienting process, the basal planes of the ice crystals rotate away from (and the c-axis rotates towards) the direction of maximum compression or shortening. While the preferred crystallographic orientations produced by these two processes may be similar, this need not always be the case. In the selective growth hypothesis, for example, one need only know the predominant current direction under the ice sheet to define the c-axis orientation in the bottom ice unit. In comparison, the strain reorientation hypothesis suggests that stresses in sea ice produced by tidal fluctuations, currents, winds and thermal processes will all control the final orientations of the c-axis point maxima. Thus the c-axis orientation cannot be modelled on the basis of a single variable.

The present paper will review literature pertaining to these two hypotheses, and will discuss experiments presently under way to determine whether these processes may lead to the development of preferred orientations in ice sheets.

TURBULENCE STUDIES IN A REGION OF HIGH TIDAL RANGE - SWANSEA BAY, BRISTOL CHANNEL, U.K.

Ian Borthwick

The tides in Swansea Bay, on the northern coast of the Bristol Channel, U.K., are amongst the largest in the world (mean spring range, 8.6). The hydrodynamics and circulation patterns in the embayment are examined, and series of 18 short-period, small-scale dye-diffusion experiments were conducted to examine the turbulence characteristics of the region. Observed currents, using both Eulerian and Lagrangian methods, indicated a complex hydrography. The embayment is stratified throughout, with values of the mean stratification parameter (N^{-2}) in the range $0.26 \times 10^{-3} - 235.91 \times 10^{-3} \text{ s}^{-2}$. The mean vertical current shear parameter ranged between $210.8 \times 10^{-3} - 9.5 \times 10^{-3} \text{ s}^{-1}$. High Richardson Numbers were observed suggesting that vertical exchange is severely reduced by stratification. The horizontal diffusion coefficients, calculated from observed dye distributions, were of the order of $10^{-2} - 10^5 \text{ cm}^2 \text{ s}^{-1}$ for time periods of $10^3 - 10^4 \text{ s}$. Vertical diffusion coefficients were of the order $2 - 20 \text{ cm}^2 \text{ s}^{-1}$, and these values are directly comparable to those estimated from current velocity measurements. These low values result from the restricted vertical exchange due to stratification. The data are directly comparable to those presented by various authors working in similar environments. The majority of the dye distributions could be modelled using a rotationally symmetrical approach, and in general, shear diffusion was not dominant over the short-time periods and small scales of observation. Similar areas, where shear diffusion is known to be dominant and stratification minimal, result in higher diffusion coefficients in the range of $10^6 - 10^7 \text{ cm}^2 \text{ s}^{-1}$ (for example, the Bay of Fundy).

CROSS-FRONT MIXING IN A FRONTAL ZONE IN THE GULF OF ST LAWRENCE

C.L. Tang

Hydrographic and remote-sensing data show that during the summer months, a quasi-permanent density front always exists near Pointe des Monts in the north-south direction. The formation of the front is the result of a combination of factors: freshwater runoff, geometry of the coastline and the Coriolis effect. Cross-front mixing is studied by water mass analysis of a CTD data set collected in 1979. The water masses in the frontal zone are mixtures of four water types: (a) the surface water outside the frontal zone; (b) the cold water at intermediate depths of 60 to 80 m; (c) the deep water; and (d) the surface estuarine water. Outside the frontal zone, the water column consists of (a), (b) and (c) and the T-S curve follows a classical pattern of vertical mixing of three water types. From the tip of the frontal layer to a distance of 20 km eastward, the water is a mixture of the same three water types, but their vertical distributions are different from those outside the frontal zone. In the upper 40 m of this region, there is enhanced mixing accompanied by vertical motion with upwelling far from the front and downwelling near the front. Inside the front, horizontal intrusions of (a) into a region below the frontal layer occurs. The generation of the cross-front flow can be understood by a conceptual model in which the cross-front circulation is driven by an internal Ekman transport underneath the lower boundary of the frontal layer.

MIXING BY INTERNAL TIDES

H. Sandstrom and J.A. Elliott

In 1980 and 1981 an experimental programme to look into the connection between turbulence and tidal currents at the edge of the Scotian Shelf was carried out. Included were measurements with moored current meters and thermistor chains, ocean turbulence probe, sectional profiles with Batfish and acoustic echo sounders and repeated CTD sections within a relatively confined region.

Our findings to date show that the tide at the shelf edge is strongly non-linear, and that the presence of the surface mixed layer has a profound influence on the dynamics of the tide. The base of the mixed layer was found to be the primary site of both baroclinic current shear and turbulent activity.

Numerous internal instabilities, including internal bores and solitons, were observed in a zone of approximately 30-km width, inshore from the shelf edge. Some of these events were tracked with the Batfish and acoustic system, and were found to travel toward the coast with a propagation speed of

approximately 1 m s^{-1} . Individual solitons, when identified and tracked, seemed to dissipate over a distance of typically 10 km.

The paper discusses the role of the non-linear instabilities in providing energy for mixing, and makes comparisons with other proposed mixing mechanisms.

REGENERATION OF NUTRIENTS IN DEEP BAFFIN BAY

E.P. Jones, A.R. Coote and D. Dyrssen

The nitrate-to-phosphate regeneration ratio in Baffin Bay at intermediate and deeper regions is lower than that typical of the ocean regions. The usual nitrogen-to-phosphate regeneration ratio $\Delta\text{NO}_3:\Delta\text{PO}_4$ is about 16, whereas we find in Baffin Bay that the ratio is about 10. The more usual ratio of 16 is implicit in the Redfield-Ketchum-Richards equation, which gives a stoichiometric relationship for relative concentrations of organic substances, nutrients, oxygen utilization and carbon dioxide. Recently Dyrssen proposed a reformulation of the Redfield-Ketchum-Richards equation with a view to representing organic substances in terms of a few recognizable organic compounds. The amount of each compound is adjustable and represents the organic part of the equation more realistically. By assuming an Atlantic origin for the Bottom Water of Baffin Bay we have calculated the regeneration coefficients for the Dyrssen formula. With some reservations we conclude that a stoichiometric representation of biogenic matter in Baffin Bay can be obtained from our data and that this representation shows a higher than expected ratio of carbohydrate groups to lipid groups and a lower than expected ratio of protein groups to phosphate groups.

PHYSICAL ENVIRONMENTAL OBSERVATIONS MADE FROM DRILLING UNITS OFF THE EAST COAST OF CANADA

P.E. Vandall, Jr and W.S. Appleby

Guidelines regarding the collection of physical environmental data have been developed and implemented by the Canada Oil and Gas Lands Administration for companies involved in exploring for oil and gas on Canada lands. A detailed description is given of these guidelines and the rationale behind them along with a summary of the information that has been collected to date. Several examples of the available data will be discussed.

ON THE ANNUAL MARCH OF THE HEAT BUDGET OF THE NORTH ATLANTIC OCEAN

Peter J. Lamb and Andrew F. Bunker

This paper documents the annual march of the following sea-air interaction and upper oceanic processes for the 70° – 30°N region of the Atlantic: the net surface heat gain, the subsurface heat storage change, the divergence of the "vertically and zonally integrated net meridional heat transport" (VZINMHT), and the VZINMHT itself. The results for the first three parameters are presented in the form of averages for 10° zones; the VZINMHT estimates are for latitude circles 10° apart. The net surface heat gain is investigated using a monthly mean time-scale, and the remaining parameters are treated on a bimonthly average basis.

The recent sea-air heat exchange research of Bunder (WHOI) provided the basis for the estimation of the net surface heat gain, which was obtained as the residual of the conventional surface heat budget equation. The results shown will include the first substantial presentation of any of Bunker's monthly (as opposed to annual) mean patterns. Estimation of the subsurface heat storage change was made using 157,085 temperature soundings for the decade 1967–76, a 5° latitude-longitude square horizontal resolution, and 14 oceanic layers between the surface and 500 m. It thus extended to a much greater depth than the 275-m limit employed in Oort and Vonder Haar's (1976, *JPO*) hemispheric study. Separate results will be presented for the upper 100, 300, 400 and 500 m; these reveal interesting spatial and annual variations in the heat content of various layers. The VZINMHT divergence for a latitude zone was obtained as the difference between the rates of net surface heat gain and subsurface heat storage change. With the adoption of near-zero 70°N VZINMHT boundary conditions computed from Aagaard and Greisman (1975, *JGR*), these divergence values were then converted (by southward integration) into VZINMHT estimates for the zones' bounding latitude circles. With the possible exception of November–December, the VZINMHT is found to be northward throughout the study region. The presentation of the VZINMHT and VZINMHT

divergence results will also emphasize the differences between the magnitudes obtained from 300- and 500-m heat storage change integrals.

Session 6B

Air Quality

Fris. 0830-0945

A SPECULATION ON THE EFFECT OF VOLCANOES ON CLIMATE

W.F.J. Evans

The recent explosive eruptions in January from an unidentified volcano and in April from El Chichon in Mexico have injected large amounts of sulphur dioxide into the stratosphere. This will be chemically converted into sulphate aerosols over the next few months; the resulting aerosol layer will persist for several years. This layer will cause heating of the stratosphere and perturbations in the radiative balance of the atmosphere as a whole. The solar beam has been attenuated by about 3% from the January eruption and even more by the recent Mexican eruption.

The recent literature on the radiative effects of volcanoes on climate is reviewed. It is the conclusion of this review that volcanoes have a significant effect on surface climate. The recent large eruptions have heightened scientific interest in this topic.

CLOUD AND PRECIPITATION INTERACTION WITH A PLUME OF POLLUTANTS

G.A. Isaac, J.W. Strapp, R. Leitch, J.B. Kerr and H.A. Wiebe

In order to begin studies of mechanisms whereby airborne pollutants are scavenged by clouds and precipitation, an NAE Twin Otter was instrumented with cloud physics and air quality equipment. This package was tested during flights near the Inco stack at Sudbury, Ontario during March 1981. The Twin Otter has been used for cloud physics research and thus already had instrumentation onboard to measure the size distribution of all cloud hydrometeors from small cloud droplets to large raindrops and snowflakes, as well as a complete range of turbulence parameters. For this study, most of the development work centred on installing cloud and precipitation water samplers, SO₂ monitoring equipment, particle-size spectrum analysers and air quality filter packs. Some of the equipment that had rarely been used before on board an aircraft included: a Brewer ozone spectrophotometer modified to detect the total amount of SO₂ in a vertical column above the sensor, a SUNY-developed water collector that separates rain and cloud water, and a PMS ASASP probe that measures the size spectrum of aerosols between 0.1 and 3 µm diameter.

The aircraft wind measuring equipment enabled the Inco plume to be easily detected several kilometres downwind of the source. Many of the measurements were made about 50 km downwind of the stack at times when the plume was entering clouds and/or precipitation. It was found that the pollutants were being "pumped" out of the sub-cloud layer by both precipitating and non-precipitating clouds. The PMS ASASP probe appeared to perform well both in and out of cloud and its results, coupled with the cloud droplet data, suggested that condensation may well be the most important aerosol scavenging mechanism in connection with acid precipitation. In addition, estimates were also made of the total flux of pollutants from the stack using the air quality instrumentation.

AIRCRAFT MEASUREMENTS OF CLOUD AND PRECIPITATION SCAVENGING IN POLLUTED AIR MASSES IN SOUTHERN ONTARIO

J.W. Strapp, H.A. Wiebe, R. Leitch, G.A. Isaac and J.B. Kerr

After design and testing of an aircraft platform for measurements of air chemistry, cloud physics and dynamics in plume studies out of North Bay, Ontario, further experiments with The National Aeronautical Establishment Twin Otter were conducted out of London, Ontario, to investigate scavenging processes in polluted air masses by clouds and precipitation. Approximately 15 research flights were accomplished during September–November 1981, in a variety of synoptic situations that included: widespread precipitation in a polluted southwest flow; a well-defined precipitation line in a polluted warm sector; a field of small cumulus clouds in a polluted warm sector; snow showers in a clean northwest flow after the passage of a cold front. Data analysis from these flights is continuing, but some interesting case studies of scavenging in a precipitation line and by cumulus clouds will be presented. Condensation appears to be an efficient scavenging mechanism in clouds.

MICROMETEOROLOGY AND DRY DEPOSITION OF PARTICLES

F. Fanaki, M. Ibrahim and L. Barrie

During the year 1980–1981, two field studies were carried out at Chalk River, Ontario, to determine the particle dry deposition to snow as a function of micrometeorological conditions.

In these studies three micrometeorological profile towers for measuring wind speed and temperature, a Richardson tower and one-level measurement of wind direction were employed. The site was also equipped with a source of submicron and supermicron ammonium sulphate particles tagged with radioisotope S^{35} . Monitoring equipment was used at strategic locations downwind from the source to monitor particulate concentration.

The paper presents the experimental observations of dry deposition in terms of the micrometeorological conditions. The role played by the micrometeorology of the atmospheric sublayer over snow will be discussed.

PLUME RANDOMIZATION AS A METHOD TO ADDRESS WIND DIRECTION UNCERTAINTY EFFECTS IN DISPERSION MODELS

S.K. Sakiyama

When comparing dispersion model predictions of ground level concentrations (GLCs) with observed values, a major uncertainty often exists about the location of the plume centreline with respect to the monitor owing to the nature of wind direction measurements. Sector averaged values (if the wind vector is within a specified angular sector about the line joining the source and monitor) can be used to address this problem. The undesirable result of sector averaging is a prediction of a lower frequency of high GLCs at the monitor than would actually occur. Various sector averaging techniques are reviewed and their merits and weaknesses discussed. It is concluded that randomizing the plume position within the sector will yield more physically realistic GLC frequency distributions.

Session 7A Low-Frequency Waves

Fri. 1015–1100

ON THE RELATIONSHIP BETWEEN INTERANNUAL BAROCLINIC WAVES AND FISH POPULATIONS IN THE NORTHEAST PACIFIC

Lawrence A. Mysak, William W. Hsieh and Timothy R. Parsons

From the cross-spectral analysis of 40–80 years of coastal sea-level, sea surface temperature and salinity data in the Northeast Pacific, we found coherent signals at frequencies of 0.09, 0.17–0.20, 0.33, and 0.43 cycles per year, (corresponding to periods of 11, 5–6, 3, and 2.3 years). The strong 5–6 year oscillation, besides appearing in the sea-level cross-spectrum, was manifested as a sea level–temperature oscillation near Vancouver Island, and as a sea level–salinity oscillation farther north. This signal was found to propagate northward, with a phase speed roughly comparable to that of a coastally-trapped baroclinic Kelvin wave. The 3-year oscillation, which appeared to be cut off at higher latitudes, could be due to a westward propagating baroclinic Rossby wave.

The relationship between these signals, which we interpret as baroclinic waves, and fish populations was then investigated. Cross-spectral analysis of the annual sockeye salmon (*Oncorhynchus nerka*) catch and herring (*Clupea pallasii*) recruitment with the physical variables was performed. Both the sockeye catch and the herring recruitment were coherent with the 5–6 year signal from British Columbia up to southeastern Alaska.

We speculate that the temperature and salinity oscillations associated with baroclinic waves may affect fish populations. A more detailed study of the Fraser River sockeye showed that both the average weight per fish and the total number of fish caught were coherent with the 5–6 year signal.

FREELY PROPAGATING TRENCH WAVES ON A BETA-PLANE

Andrew J. Willmott

The dispersion relation is derived for barotropic long trench waves on a mid-latitude β -plane. It is found that a critical wavenumber k_c , which depends on trench orientation and wave frequency, governs the

behaviour of each trench wave mode. Leaky modes occur when the wavenumber k of a particular mode satisfies $k < k_c$, in which case the energy radiates away from the trench into the ocean interior in the form of linear Rossby waves. Trapped modes occur when $k > k_c$, in which case wave propagation occurs over the shelf and trench only and the energy decays exponentially in the ocean interior. Dispersion curves and eigenfunctions are presented for the Peru-Chile, Japan-Kuril and Aleutian trenches. Also calculated for each of these trenches are the critical wavelength and wave period for the fundamental mode, at the transition point between leaky and trapped wave propagation. The theory suggests that leaky trench wave modes might be another generating mechanism for barotropic Rossby waves in the ocean interior.

SUBINERTIAL FLUCTUATIONS IN THE SOURCE REGION OF THE SOMALI CURRENT

Gordon J. Mertz and Lawrence A. Mysak

Current and temperature data were collected in the source region of the Somali current, jointly by the Universities of Kiel and Miami, as part of the INDEX pilot studies. The data were collected over a six-month period (January–July, 1976), which spans the springtime Monsoon reversal. The experiment and data are described in Düing and Schott (*J. Phys. Oceanogr.*, 1978).

This paper describes the results of the spectral analysis of fluctuations found in data from the experiment's two southernmost sensor locations. It is found that, once the annual cycle is removed, most of the variance in these current and temperature records resides in subinertial fluctuations. The most prominent spectral feature is a 50-day peak. An analysis of different segments of the data shows that the 50-day peak is highly transient, exhibiting rapid changes in amplitude during certain parts of the records.

This 50-day period is coincident with that of the global-scale circulation cells found in the tropical atmosphere by Madden and Julian (*J. Atmos. Sci.*, 1971 and 1972). In this paper, it is suggested that wind-forcing excites a long coastally trapped wave and that the observed amplitude variation is due to changing mean conditions (e.g. vertical velocity shear and stratification) rather than due to changes in the forcing field itself.

Session 7B

Oceanic Modelling

Fri. 1100–1200

MODELLING THE NON-TIDAL BAROTROPIC CIRCULATION IN THE BAY OF FUNDY AND GULF OF MAINE

David A. Greenberg

Two fully non-linear two-dimensional numerical models are used to look at the residual circulation that is generated by tides or winds. The first, a multi-grid model, is used to look at the Bay of Fundy with a coarse look at the Gulf of Maine. The circulation in the Bay of Fundy is generally tidally driven. The model clearly produces the major gyres at the head of the Bay. Applied wind stresses have some effect on the strength of these currents but little effect on the pattern. The anticlockwise gyre in the body of the Bay of Fundy is not reproduced in the model. The second model covers the lower Bay of Fundy and the Gulf of Maine with one fine grid and is used to look at details in the Gulf of Maine. The circulation around Georges Bank and Nantucket Shoals is clearly indicated from tidal forcing alone as is a gyre over the shallow part of Browns Bank. Different steady wind stresses give rise to variations in current strength and current patterns. The anticlockwise "Maine" eddy is only found in the model when forced by a steady northeast wind stress. Such a wind stress is difficult to justify on the basis of observations. This gyre and the Bay of Fundy gyre are thought to be caused by baroclinic effects not modelled. The effects of sea-surface slope along and across the continental shelf are to be investigated.

LOW-FREQUENCY WAVE MOTION OVER STRONG TOPOGRAPHY

Yves Gratton

A two-layer model is used to study analytically the properties of topographic planetary waves propagating over strong, $O(1)$, topographic slopes. In a body of water similar in shape and in size to the Strait of Georgia (British Columbia), these waves are characterized by small wavelengths (< 40 km) and long periods (5–60 days).

UPWELLING OFF SOUTHWEST NOVA SCOTIA: OBSERVATIONS AND THREE-DIMENSIONAL MODELLING

D. Lefavre, K.-T. Tee, and P.C. Smith

In the course of monitoring the low-frequency circulation off southwest Nova Scotia using an array of six moorings, a significant feature appeared. While the circulation is basically alongshore, the near-bottom flow showed a strong onshore component. To investigate this further, two heavily-instrumented nearshore moorings off Cape Sable were maintained over a three-year period. Data analysis from these moorings indicates that the strength of the onshore flow is related to the fortnightly tidal cycle. This has led to the hypothesis that the tidal flow generates centrifugal upwelling as it moves around the circular-shaped coast. A three-dimensional model of the current has been developed to test that hypothesis. It is a four-step model. It involves the following sequence of modelling: (1) A horizontal two-dimensional M_2 tidal model using the tidal elevation as input. (2) The vertical profile of the tidal current of step (1) at every grid point using field data to evaluate bottom friction. (3) A horizontal two-dimensional residual flow model. (4) The vertical profile of the residual flow using results of both steps (2) and (3). Comparison with the tidal flow has been made.

DYNAMICS OF THE FRESH WATER PULSE

K.-T. Tee

The fresh water pulse, which is characterized by a minimum salinity, has been found in many coastal areas. Using a 2-D estuarine circulation model and a seasonal variation of the fresh water runoff, a series of numerical experiments has been carried out to investigate the distribution, formation and propagation of the pulse. An example of such a computation is shown for the St Lawrence Estuary. The pulse is found to develop initially near the surface at two locations. The first location is near the river entrance where the early formation is mainly due to the direct influence of the river runoff. The second location is where the background salinity gradient, and thus the amplitude of the pulse, is maximum. For the propagation of the pulse, it is found that the pulse does not respond entirely like a tracer because: 1) the development of the pulse in the downstream location starts earlier due to the early arrival of the internal disturbance generated at the slope region, and 2) the reduction of the pulse's amplitude, due to the forcing on the pulse by the non-linear feedback of the current on the salinity, is smaller than that estimated by the diffusion alone. In the deeper water, the pulse, because its generation is mainly due to the downward diffusion from the surface, is smaller and arrives later. The vertical velocity induced by the pulse is found to affect strongly the horizontal distribution of the pulse in the deep water.

Session 7C Boundary-Layer Meteorology

Fr. 1015-1130

STRUCTURE FUNCTIONS OVER LAKE ONTARIO

Robert Golus, Mark Donelan and H.A. Panofsky

For practical applications in remote sensing, it is often necessary to estimate structure constants for light or sound from ordinary shipboard data, e.g. surface temperature, and wind, moisture and temperature measured from a ship at 10 m above the surface.

In this paper, such estimates are compared with more direct measurements of the structure constants. The structure constants are computed from spectra of moisture and temperature obtained during project IFYGL during a wide range of stabilities. These "measurements" are compared with estimates from mean quantities by use of bulk formulae.

Agreement is quite good for C_T^2 and C_q^2 (for temperature and moisture). However, the C_n^2 for index of refraction of sound seems poorly determined from the direct measurements.

TIME-AVERAGE OF THE NON-LINEAR STRESS LAW

Daniel G. Wright, Keith R. Thompson and Richard F. Marsden

Assuming the mean velocity and the probability distribution of the background motions are known, an

expression for the mean value of any function of velocity is given. For an isotropic background velocity field, the mean stress is shown to be a simple, non-linear function of the mean current speed and the standard deviation of the fluctuations. Results are compared for several forms of the drag coefficient, which is assumed to vary with current speed.

Using three-hour wind data from eight North Atlantic Ocean Weather Ships, it is shown that the formula is accurate (± 0.02 Pa) for an averaging period of four months. For an averaging period of one month, the formula slightly overestimates the stress. This is due to skewness in the probability density function of the background fluctuations. However, the effect of skewness could be readily included if desired.

A procedure for estimating low-frequency wind stress fluctuations over the North Atlantic is outlined using the approximate formula. Spatially-smoothed mean surface winds are estimated from geostrophic winds using an empirically-determined contraction and rotation; monthly variances of the background fluctuations are shown to be dominated by the deterministic seasonal variation.

THE SPECTRA OF WIND, TEMPERATURE AND HUMIDITY AT SABLE ISLAND, N.S.

R.J. Anderson and S.D. Smith

Turbulent fluxes of wind, temperature, and humidity have been measured under varying atmospheric conditions during three separate experiments at a beach site on Sable Island, Nova Scotia. The variations with atmospheric stability of the spectral shapes for wind, temperature and humidity and the cospectral shapes for momentum, heat, and moisture fluxes agree with spectral shapes reported in the literature. The downward fluxes of humidity during stable atmospheric conditions ($z/L > 0.1$) are of particular interest because very few examples have been published.

Spectral values in the inertial subrange of temperature, wind and humidity can be used to obtain the fluxes from "dissipation" estimates: this method is compared with direct measurements.

FLOW MODIFICATION OVER A LOW HILL

R.E. Mickle, P.A. Taylor and J.R. Salmon

In February 1981, detailed measurements of mean flow in the boundary layer over an isolated hill near Pincher Creek, ALTA were made from 3- and 10-m towers. Results of the modifications of wind speed at 3, 6 and 10 m will be presented and compared with theoretical calculations. Preliminary results from a later experiment using tether sondes will also be discussed.

SOME RESULTS REGARDING BAROCLINICITY DEPENDENCE OF THE UNIVERSAL FUNCTIONS OF ROSSBY-NUMBER SIMILARITY THEORY

Sandor Csanady

The accurate determination of the cross-isobar angle plays a role in several computational forecasts models; therefore, the precise form of the momentum related universal functions from similarity theory are important. Quantitative investigations about the effects of baroclinicity on those functions resulted in major improvements in their predictive accuracy. A general baroclinic dependence was derived theoretically by Arya and Wyngaard (1975), to which the present author – based on the evaluation of results from a second-order closure boundary-layer model – introduced some improvements. It is argued that the universal functions of the resistance laws A and B are not really determined by assuming that they are functions of internal stability only, i.e. functions of $\mu = H/L$, where H is the outer length scale of the boundary layer and L is the inner or Monin-Obukhov length, but they must also be functions of the dimensionless baroclinicity, $1/f(\partial U_g/\partial z)$; moreover the contribution of baroclinicity, can account for more than 50% of the value of A or B . Further, since baroclinicity is rather the rule than the exception in the atmospheric boundary layer the need for quantitative expressions is clear.

The numerical model provides evidence that even for barotropic neutral cases these constants are slightly different from values given by previous authors. Notably, Clarke and Hess (1975) based their values on the Wangara experiment and arrived at $A = 4.1$ and $B = 2.24$; Arya in 1975 carefully re-evaluated both the Wangara and the Kansas data and gives $A = 4.5$, $B = 1.5$. The author found these

values, determined from a 3-D numerical model, as $A = 3.7$ and $B = 3.3$. More importantly the baroclinicity dependence was introduced as a dimensionless parameter that included the angle between the surface wind and the thermal wind:

$$A(\mu, \lambda) = 3.7 + \frac{k}{2} \frac{z_i}{u_*} \frac{\partial U_g}{\partial z} \cos \beta$$

$$B(\mu, \lambda) = 3.3 + \frac{k}{2} \frac{z_i}{u_*} \frac{\partial U_g}{\partial z} \cos \beta$$

The application of these functions to the AMTEX data resulted in a forecast of the cross-isobar angle as $\alpha = 25.7^\circ$, as opposed to 6° predicted by Arya's form, or 11° predicted by Clarke and Hess's form. The actual value was $\alpha = 32^\circ$.

A second interesting characteristic of these universal functions is that a definite increasing trend manifests itself in their numerical values going from winter to summer cases. This finding was first published by Hasse (1981) based on measurements in the Baltic Sea area giving $A = 1.6$ and $B = 3.0$ for winter and $A = 5.7$ and $B = 3.9$ for summer. The evaluation of several runs of the 3-D higher order closure model seems to fully support this finding.

Session 7D

Climate

Fri. 1015-1200

POSSIBLE ORIENTATIONS FOR A CANADIAN CARBON DIOXIDE PROGRAMME

R.G. Lawford

There is mounting evidence to indicate that increasing carbon dioxide concentrations in the atmosphere will lead to a global warming. The effects of such a warming will be most significant for temperature and precipitation patterns at Canada's latitudes.

In this presentation, Canada's role in the carbon cycle and the possible social and economic impacts of a global warming are reviewed. Based on this review, possible elements for a National Canadian Carbon Dioxide programme are identified.

LIGHTNING HAZARD IN MANITOBA: A CLIMATOLOGICAL LOOK

Steve LaDochy

Compared with other types of severe weather, lightning is often underestimated in its destructiveness. While mortality and property damage by lightning is found to be relatively low in Manitoba, a great deal of damage and losses of millions of dollars occur each year due to lightning-caused forest fires and transmission-line interruptions. This study looks at the magnitude of damage due to this natural hazard, as well as at areas of high risk. The distribution of lightning-caused forest fires and power outages are mapped and analysed for seasonal and diurnal variations. Comparisons are made between lightning strikes and thunderstorm days, as well as with hail and tornado events. The weather-type for large electrical storms is identified.

SOME ASPECTS OF THE CALIBRATION OF EARLY CANADIAN TEMPERATURE RECORDS - A CASE STUDY FOR EASTERN HUDSON BAY, 1814 TO 1821

C. Wilson

An attempt has been made to calibrate some of the early temperature records kept at the Hudson's Bay Company Posts of Great Whale, Fort George and Eastmain during the early nineteenth century*. The calibration has been approached from both a physical and a statistical standpoint, treating both the systematic temperature differences that might arise as a result of changes in instruments, their exposures and observing practices (given the distinctive qualities of these northern sites), and the application of current Canadian Quality Control procedures as part of the process of adjustment.

*Under contract to the Atmospheric Environment Service of Canada, and with the kind permission of the Hudson's Bay Company.

Three aspects of the results are discussed:

- i) the temperature differences resulting from changes in observing practices are compared with those associated with instruments and their exposures;
- ii) the usefulness of extending the current quality control procedures to include early temperature data;
- iii) confidence limits

The adjusted temperature series strongly suggest that the summers of 1816 and 1817 on the coast of James Bay and Hudson Bay were more severe than any experienced since modern meteorological records began in 1915 (Fort George) and 1925 (Great Whale). There is evidence that the mean daily temperature at Great Whale for July 1816 may have been as much as 5.9°C below the 1941–1970 normal value, and about 2.4°C below the lowest July mean daily temperature in the station record.

THE COMBINED ACTION OF THE ATMOSPHERIC CIRCULATION AND RELIEF ON THE PRECIPITATION REGIME IN COLOMBIA

I. Noe Dobrea

The main factor that affects the climate of Colombia is its location in the tropical zone of South America, bordered by two oceans and with a North-South chain of mountains.

Dynamically, the seasonal movement of the intertropical convergence (ITC) zone, determines both the temperature and intensity of the main meteorological parameters. These characteristics are particularly important in the case of precipitation.

The following main characteristics of the precipitation distribution in Colombia are outlined:

- a) The direct influence of the movement of the ITC on the maximum precipitation in the eastern plains of Colombia: an analysis of the precipitation distribution is shown through a longitudinal cross-section along 67°W, between 0 and 12°N emphasizing the relation between the mean position of the ITC and the maximum precipitation.
- b) The location of the maximum precipitation area at high altitudes of the Andes and its dependence on the advection of the air masses.
- c) The presence of orographic precipitation in the foothills of the Andean mountains. The intensity of orographic precipitation is emphasized, as well as its contribution to the centre of maximum precipitation in the Pacific region of Colombia (approximately 10,000 mm).
- d) The influence of the local circulation on the precipitation in the mountains. The existence of drought is evident in the interior of the Andes with respect to the influence of the atmospheric circulation.
- e) The unimodal and bimodal types of distribution in the annual mean precipitation in Colombia, its dependence on the movement of the ITC, emphasizing the local influences on the rainfall regime in different parts of Colombia.

THE CLIMATOLOGY OF TORNADES IN CANADA FOR THE PERIOD 1950–1979

M.J. Newark

Other than the ground-breaking work of Lowe and McKay (who 20 years ago published several articles concerning tornadoes in Western Canada), little has been known about the incidence of tornadoes and the risk of tornado damage, injury or death in Canada. Data concerning tornadoes during the period 1950 to 1979 (and earlier) have been gathered from many sources and processed to arrive at a set of quantitative conclusions concerning their physical characteristics.

The task was composed of a number of steps as follows: (a) finding the data in the first place, (b) defining the terms and equations to be used in the study, (c) devising a method of dealing with the errors and inconsistencies in the data, (d) encoding data into a quantitative form, (e) computerizing the encoded data for ease of sorting and calculation, and (f) analysing the results.

The results indicate that tornado incidence (the number of tornadoes per unit area per unit time) in populated sections of Canada is compatible with the incidence values published for adjacent American States, and that the highest annual risk of tornado damage is in Southwestern Ontario (0.05 to 0.1% km⁻²) followed by southeastern Manitoba (0.05% km⁻²).

In terms of size, the average Canadian tornado (regardless of intensity) has mean dimensions of 13.7 km in length, 182 m in width, and 7.1 km² in area. In Southwestern Ontario, the return period of an F3 or

stronger tornado is 5 years, and it is likely to have mean damage dimensions of 84.8 km in length, 917 m in width and 76 km² in area.

WEATHER OUTLOOK BY CONTINGENCY ANALYSIS OF 100-50 KPA MEAN MONTHLY THICKNESS FIELD

L.O. Mapanao

The method of contingency analysis was used to estimate the conditional probability distribution of a predictand vector Y given antecedent predictor vector X . The primary objective was to explore whether any precursory information can be derived from antecedent fields of geopotential thickness that may be utilized in planning for the effective use of resources during drought situations.

Model verifications with a 1974 independent sample will be discussed.

ÉTUDE DE LA CIRCULATION GÉNÉRALE DE L'ATMOSPHÈRE PAR LES MÉTHODES DE LA CLIMATOLOGIE SYNOPTIQUE

J. Litynski et J. Sockenski

La classification des types de circulation générale est basée sur l'analyse de la distribution spatiale des indices de circulation: l'indice zonal et l'indice méridien, ainsi que sur la valeur de la pression moyenne sur l'hémisphère nord (du pôle au 20° parallèle). Cette analyse est possible grâce à l'enregistrement par l'Environnement Canada des données concernant la pression atmosphérique sur l'hémisphère nord pour la période 1949-76.

Des choses intéressantes se dégagent de cette analyse:

- la pression moyenne au niveau de la mer de l'hémisphère nord subit des changements lents avec la composition périodique beaucoup plus simple que les changements de la pression locale;
- la distribution spatiale des indices régionaux de circulation se prête très bien à l'analyse harmonique et on pourra décrire cette distribution en utilisant un nombre limité des paramètres numériques (huit pour chaque indice);
- les seuils saisonniers de la pression moyenne (au printemps et en automne) font des oscillations d'une année à l'autre et on espère pouvoir établir une relation entre la position de chaque seuil et la caractéristique de la saison qui suit.

La classification des types de circulation générale est faite en deux étapes:

1. classification des types généraux basée sur la pression moyenne et les paramètres numériques de la distribution spatiale des indices de circulation;
2. classification des types régionaux pour les six (6) zones choisies (Europe, Asie de l'Ouest, Asie de l'Est, Pacifique, Amérique du Nord et Atlantique).

L'étape finale de travail constitue la compression entre les anomalies climatiques en hiver au Canada et les types de circulation générale.

**SIXTEENTH ANNUAL GENERAL MEETING
CANADIAN METEOROLOGICAL AND OCEANOGRAPHIC
SOCIETY**

**Ottawa
26 May 1982**

AGENDA

1. Adoption of Agenda
2. Minutes of the Annual General Meeting, 27 May 1981
3. Annual Reports from the Executive
 - a) President's Report
 - b) Treasurer's Report
 - c) Corresponding Secretary's Report
4. Annual Reports from Committees, Editors and Archivist
 - a) Editorial Committee
 - b) CMOS *Newsletter* Editor
 - c) Scientific Committee
 - d) Standing Committee on Public Information
 - e) Membership Committee
 - f) Financial Development Committee
 - g) Committee on Professionalism
 - h) Prizes and Awards Committee
 - i) Education Committee
 - j) Society Archivist
5. Annual Reports from Local Centres and Chapter
6. Annual Reports from Special Interest Groups
7. Budget for 1982 and projected Budget for 1983
8. Motions from Council
 - a) Membership and Subscription fees for 1983
 - b) Amendments to By-Laws
 - c) Other
9. Locations of Future Congresses
10. Future of Special Interest Groups
11. Use of the Development Fund
12. Other Business
13. Report of the Nominating Committee
14. Installation of Officers for 1982-83

**SEIZIÈME ASSEMBLÉE GÉNÉRALE
ANNUELLE DE LA SOCIÉTÉ CANADIENNE
DE MÉTÉOROLOGIE ET D'OcéANOGRAPHIE**

**Ottawa
Le 26 mai 1982**

ORDRE DU JOUR

1. Présentation de l'ordre du jour
2. Procès-verbal de l'assemblée générale annuelle, le 27 mai 1981
3. Rapports du Bureau d'administration
 - a) Rapport du président
 - b) Rapport du trésorier
 - c) Rapport du secrétaire-correspondant
4. Rapports annuels des comités, des rédacteurs et de l'archiviste
 - a) Comité de rédaction
 - b) Rédacteur du *Bulletin de nouvelles* de la SCMO
 - c) Comité scientifique
 - d) Comité permanent d'information publique
 - e) Comité d'éligibilité des membres
 - f) Comité de développement financier
 - g) Comité sur le professionnalisme
 - h) Comité des récompenses
 - i) Comité de l'éducation en météorologie
 - j) Archiviste de la Société
5. Rapports annuels des centres locaux et de section
6. Rapports annuels des groupes d'étude de sujets particuliers
7. Budget pour 1982, budget projeté pour 1983
8. Propositions du Conseil d'administration
 - a) Cotisations pour 1983
 - b) Amendements aux règlements
 - c) Divers
9. Lieux où se tiendront les congrès à venir
10. Avenir des groupes d'étude de sujets particuliers
11. Utilisation des fonds de développement
12. Divers
13. Rapports du comité de mise en candidature
14. Investiture des membres du Bureau d'administration pour 1982-83

**MINUTES OF THE FIFTEENTH ANNUAL GENERAL MEETING OF
THE CANADIAN METEOROLOGICAL AND OCEANOGRAPHIC
SOCIETY HELD ON MAY 27, 1981 AT 1900 H, UNIVERSITY OF
SASKATCHEWAN CAMPUS, SASKATOON, SASKATCHEWAN**

J. Maybank, President, called the meeting to order at 1915 h with 56 members present.

1. Adoption of Agenda

The agenda was adopted as published on page 56 of the Fifteenth Annual Congress Issue of *ATMOSPHERE-OCEAN* with the following additions:

- Under item 3 – add Auditor's Report
- Items 4e and 4g – to be discussed with item 8c

2. Minutes of the Fourteenth Annual General Meeting, 22 May 1980

P. LeBlond moved, seconded by G. McKay, that the minutes be adopted as published in the Fifteenth Congress Issue of *ATMOSPHERE-OCEAN*. MOTION PASSED.

3. Annual Reports from the Executive

a) President's Report: J. Maybank

The President submitted his report as given on pages 70–80 of the Fifteenth Congress Issue noting that an educational committee was strongly recommended, the prizes and awards structure of the Society has been reviewed, a by-laws review committee has been set up, the future executive would be located in the Ottawa area, and a permanent office has been established in Ottawa with the Canadian Association of Physicists.

b) Treasurer's Report: R. Angle

R. Angle submitted the Treasurer's report as presented on pages 81–86 of the Fifteenth Congress Issue noting the Society is on budget for the current year.

c) Corresponding Secretary's Report: P. Kociuba

P. Kociuba elaborated on the current membership status noting there are now 871 members and 13 corporate and sustaining members. He also noted that 100 subscriptions to *Chinook* Magazine had now been received. The *Chinook* offer remains open.

d) Auditor's Report: R. Angle

R. Angle submitted the Auditor's report as shown on pages 86–87 of the Fifteenth Congress Issue.

J. Powell moved the Executive Reports be accepted, seconded by D. Bauer. MOTION PASSED.

4. Annual Reports from Committees, Editors and Archivist

a) Editorial Committee

P. LeBlond submitted the Editorial Committee report on behalf of H. Leighton as shown on pages 87 and 88 of the Fifteenth Congress Issue noting that at present submissions to *ATMOSPHERE-OCEAN* were climbing.

b) CMOS Newsletter Editor

A. Mann submitted the Newsletter Editor's report as shown on pages 88 and 89 of the Fifteenth Congress Issue and thanked members of the Society for their contributions and assistance in preparation of the Newsletter.

c) Scientific Committee Report

G. Boer submitted the report of the Scientific Committee as published on pages 89–90 of the Fifteenth Congress Issue and added comments on the meteorological education and training issue.

d) *Standing Committee on Public Information Report*

J. Kotylak submitted the committee report as published on pages 91-92 of the Fifteenth Congress Issue noting the committee had completed a monograph on Meteorological Careers and will now focus on one for Oceanography.

e) *Membership Committee Report*

C. McLeod presented the report of the Membership Committee published on pages 92-93 of the Fifteenth Congress Issue.

f) *Financial Development Committee Report*

R. Angle presented the Financial Development Committee report published on pages 93-94 of the Fifteenth Congress Issue noting the committee was not particularly active.

g) *Professionalism Committee Report*

R. Charlton presented the report of the Committee on Professionalism as published on pages 95-96 of the Fifteenth Congress Issue noting the Directory of Consultants had been distributed to 230 individuals and institutions and a second edition will be prepared.

h) *Awards Committee Report*

J. Maybank noted the awards would be announced at the Congress banquet.

i) *Citations Committee Report*

J. Maybank reported that there were no citations recommended this year.

j) *Society Archivist*

M. Thomas reported that historical material of the Society was being collected and organized.

G. McKay moved the annual reports be accepted, seconded by R. Asselin. MOTION PASSED.

5. *Annual Reports from Local Centres and Chapters*

After several Centres and Chapters provided brief updates of their activities E. Lozowski moved adoption of the reports, seconded by R. Asselin. MOTION PASSED.

6. *Annual Reports from Special Interest Groups*

J. Reid presented the report of the Air Pollution Meteorology Special Interest Group as published on page 112 of the Fifteenth Congress Issue elaborating briefly on their activities.

G. Schaefer reported on the Hydrology Special Interest Group noting that their terms of reference were similar to those of the Air Pollution Meteorology Special Interest Group.

J. Powell moved the adoption of the reports, seconded by J. Kotylak. MOTION PASSED.

7. *Budget for 1981 and Projected Budget for 1982*

R. Angle submitted the budgets as published on page 86 of the Fifteenth Congress Issue noting that 1981 looks good but that in 1982 some reduction in expenses will be required if the NSERC grant is not received. G. McKay moved the adoption of the budget, seconded by R. Asselin. MOTION PASSED.

8. *Motions from Council*

a) *Membership and Subscription Fees for 1982*

R. Angle moved the fee structure remain unchanged except that institutional subscriptions be raised to \$50.00 per year for 1982, seconded by G. McKay. MOTION PASSED.

b) *Amendments to By-Laws*

BY-LAW 6(j)

After discussion of the report of the Committee on Professionalism, the role of the Society in a professional versus learned capacity and the need to protect the public interest, R. Charlton moved By-Law 6(j) (Appendix 1) be adopted, seconded by R. Angle. MOTION PASSED.

BY-LAW 16

After considerable discussion, R. Charlton moved By-Law 16 (Appendixes 1 and 2) be adopted, seconded by R. Angle. MOTION DEFEATED.

B. Boville moved a vote of thanks to the committee.

c) *Associate Memberships*

C. McLeod discussed the background and needs of establishing an Associate Membership within the Society. After some discussion regarding the financial repercussions of establishing an associate membership through its possible effects on the circulation of *ATMOSPHERE-OCEAN*, C. McLeod moved that a new class of membership to be known as Associate Membership be created for a two-year trial period and that during this trial period no current member be allowed to enroll as an Associate Member. Associate Members shall have all the rights and privileges of regular membership but shall not receive *ATMOSPHERE-OCEAN*, nor be entitled to hold office on Council or as chairman of a National Committee. Associate members are also not entitled to vote at the Annual General Meeting. MOTION PASSED.

9. *Locations of Future Congresses*

1982 Congress

L. O'Quinn, Chairman of the Local Arrangement Committee for the 1982 Congress, outlined preparations to date and noted the Congress theme will be *Sea Ice*.

1983 Congress

The Alberta Centre will host the 1983 Congress.

1984 Congress

An invitation was received from the Halifax Centre to host the 1984 Congress.

The executive agreed to take under advisement a request from G. Bristow to consider delaying the Congress two or three weeks in future years.

10. *Other Business*

None.

11. *Report of the Nominating Committee*

J. Powell moved nominations for the 1981-82 executive as published on pages 113-114 of the Fifteenth Congress Issue, seconded by P. LeBlond. MOTION PASSED.

12. *Installation of New Officers for 1981-82*

The new executive officers were introduced and installed. E. Lozowski took the chair and thanked the outgoing executive and committee members and welcomed the new members.

R. Bennett moved adjournment of the meeting at 2300 h, seconded by J. Reid.

J.H. Renick
Recording Secretary

Appendix 1

NOTICE OF MOTION FROM COUNCIL PROPOSED BY-LAW AMENDMENTS 1981

BY-LAW 6

j) A Committee on Professionalism shall be established to foster the professional ideals of personal training, responsibility, conscientiousness, self discipline and ethical maturity; to enhance the prestige of meteorologists and oceanographers; and to promote the growth and development of industrial and environmental applications of meteorology and oceanography. The Committee shall consist of a chairman and at least four other members, appointed by Council, representing the diverse interests of the federal government, provincial governments, universities, industrial corporations and consulting firms. Members may serve on the Committee up to a period of three years. The Committee shall meet at least once a year and shall prepare an annual report on its activities for Council.

BY-LAW 16—Code of Ethics

- a) The Society shall maintain a Code of Ethics for professional conduct to uphold the dignity, honour and credibility of the meteorological and oceanographic professions, to protect the public interest and to strive for continuing improvements in the benefits to society from the atmospheric and oceanic sciences.
- b) The Code of Ethics, as approved by Council, shall be appended to these By-Laws (Appendix 2). Changes shall take effect 12 months after the date on which they were approved by Council.
- c) Alleged unethical conduct shall be thoroughly investigated by the Committee on Professionalism and the findings reported to Council.
- d) Disciplinary action arising from breaches of the Code may only be taken by Council, and then only after receiving a report and recommendations from the Committee on Professionalism.

Appendix 2 – Code of Ethics

PREAMBLE TO CODE OF ETHICS

Most members of the Canadian Meteorological and Oceanographic Society (CMOS) are professionally engaged in several aspects of the Meteorological and Oceanographic sciences. Although CMOS is a Learned Society, its members and executive are convinced that the professionals among them can practice within the following Code of Ethics.

THE SPIRIT OF THE CODE OF ETHICS

CMOS recognizes that professional ethics are founded on integrity and a devotion to serve the advancement of both knowledge and human welfare. This concept should guide a professional at all times.

DUTIES OF THE PROFESSIONAL TO THE PUBLIC

A professional member of CMOS:

- 1. Shall attempt to convey to the public an understanding of the meteorological and oceanographic sciences whenever professional knowledge may be of benefit
- 2. Shall attempt to keep abreast of advances in knowledge so that the public may be kept well informed
- 3. Shall use sound scientific principles applied in a scientific manner and shall use the best available methods, techniques and data
- 4. Shall undertake only such work as can be competently performed
- 5. Shall refer requests for service that are beyond available professional capabilities or scope of service to those properly qualified

6. Shall accept credit only for such work as has been carried out or has been prepared under personal supervision
7. Shall not be associated with enterprises contrary to the public interest or sponsored by persons of questionable integrity
8. Shall not issue statements on matters connected with public policy that are inspired or paid for by private or government interests, unless it is indicated on whose behalf the statements are being made

DUTIES OF THE PROFESSIONAL TO CMOS AND ITS MEMBERS

A professional member of CMOS:

9. Shall endeavour at all times to improve the competence, dignity and prestige of the professional practice of Meteorology and Oceanography
10. Shall recognize that the profession is required by both the public and private sectors and that the Code of Ethics applies equally to both sectors
11. Shall relate to fellow professionals with fairness and good faith
12. Shall participate in scientific meetings whenever possible and endeavour to publish the results of research and investigations in CMOS publications or other suitable media
13. Shall not attempt to supplant a professional member of CMOS after definite steps have been taken towards the other's employment
14. Shall not knowingly solicit the clients of a professional member of CMOS
15. Shall not use the advantages of a salaried position to compete unfairly with a professional member of CMOS
16. Shall, on believing that a member is practising contrary to this code of ethics, advise the Committee on Professionalism of CMOS about such matters

DUTIES OF THE PROFESSIONAL TO HIS CLIENT OR EMPLOYER

A professional member of CMOS:

17. Shall act for clients or employers as a faithful agent or trustee
18. Shall accept remuneration only for advice or services that can be performed using existing qualifications
19. Shall not disclose confidential information obtained in trust from an employer or client
20. Shall not undertake any assignment that may create a conflict of interest with client or employer without the full knowledge of both the client and the employer
21. Shall refrain from making exaggerated and unwarranted claims and statements
22. Shall present clearly to clients and employers the consequences to be expected if professional judgement is overruled by other authorities.

PROCÈS-VERBAL DE LA QUINZIÈME ASSEMBLÉE GÉNÉRALE DE LA SOCIÉTÉ CANADIENNE DE MÉTÉOROLOGIE ET D'Océanographie, TENUE À 19 H LE 27 MAI 1981 AU CAMPUS DE L'UNIVERSITÉ DE LA SASKATCHEWAN, À SASKATOON

Le président, J. Maybank, ouvre l'assemblée à 19 h 15; 56 membres sont présents.

1. *Adoption de l'ordre du jour*

Les membres adoptent l'ordre du jour tel qu'il apparaît à la page 56 dans le numéro d'*ATMOSPHERE-OCEAN* relatif au quinzième Congrès, avec les modifications suivantes:

- Ajouter "Rapport du vérificateur" à l'article 3
- Les articles 4e et 4g seront incorporés à l'article 8c.

2. *Procès-verbal de la quatorzième assemblée générale, tenue le 22 mai 1980*

P. LeBlond propose, avec l'appui de G. McKay, l'adoption du procès-verbal tel que publié dans le numéro d'*ATMOSPHERE-OCEAN* consacré au quinzième Congrès. MOTION ADOPTÉE.

3. *Rapports annuels du Conseil d'administration*

a) *Rapport du président*: J. Maybank

Le président dépose son rapport (voir le numéro d'*ATMOSPHERE-OCEAN* consacré au quinzième Congrès) et souligne que la formation d'un comité de l'éducation était fortement recommandée, qu'on avait révisé la structure des prix et des distinctions décernés par la Société, qu'on avait créé un comité de révision des règlements, que le prochain Conseil d'administration aurait lieu dans la région d'Ottawa, et qu'un bureau permanent avait été ouvert à Ottawa en collaboration avec l'Association canadienne des physiciens.

b) *Rapport du trésorier*: R. Angle

R. Angle dépose le rapport du trésorier, tel que présenté dans le numéro d'*ATMOSPHERE-OCEAN* consacré au quinzième Congrès, en faisant remarquer que la Société respectait les limites de son budget pour l'année en cours.

c) *Rapport du secrétaire-correspondant*: P. Kociuba

P. Kociuba fait le point sur le nombre de membres: la Société compte actuellement 871 membres, en plus de 13 membres moraux et de soutien. Il souligne aussi qu'on avait reçu 100 demandes d'abonnement à la revue *Chinook*. L'offre présentée tient toujours.

d) *Rapport du vérificateur*: R. Angle

R. Angle dépose le rapport du vérificateur, tel que présenté dans le numéro d'*ATMOSPHERE-OCEAN* consacré au quinzième Congrès.

J. Powell, avec l'appui de D. Bauer, propose l'acceptation des rapports du Conseil. MOTION ADOPTÉE.

4. *Rapports annuels des comités, des rédacteurs et de l'archiviste*

a) *Comité de rédaction*

P. LeBlond, au nom de H. Leighton, dépose le rapport du Comité de rédaction tel que présenté dans le numéro d'*ATMOSPHERE-OCEAN* consacré au quinzième Congrès, et il indique que de plus en plus d'articles sont soumis.

b) *Rédacteur du Bulletin de la SCMO*

A. Mann dépose le rapport du rédacteur du *Bulletin*, tel que présenté dans le numéro d'*ATMOSPHERE-OCEAN* consacré au quinzième Congrès, tout en remerciant les sociétaires de leurs contributions et de leur aide dans la préparation du *Bulletin*.

c) Rapport du Comité scientifique

G. Boer dépose le rapport du Comité scientifique, tel que présenté dans le numéro d'*ATMOSPHERE-OCEAN* consacré au quinzième Congrès, et formule certains commentaires sur la question des études et de la formation en météorologie.

d) Rapport du Comité permanent d'information publique

J. Kotylak dépose le rapport du Comité, tel que présenté dans le numéro d'*ATMOSPHERE-OCEAN* consacré au quinzième Congrès, en soulignant que le Comité, après avoir terminé une monographie sur les carrières en météorologie, entreprendra la préparation d'un document similaire pour le domaine océanographique.

e) Rapport du Comité d'éligibilité des membres

C. McLeod dépose le rapport du Comité, tel que présenté dans le numéro d'*ATMOSPHERE-OCEAN* consacré au quinzième Congrès.

f) Rapport du Comité du développement financier

R. Angle dépose le rapport du Comité, tel que présenté dans le numéro d'*ATMOSPHERE-OCEAN* consacré au quinzième Congrès, tout en faisant remarquer que le Comité n'avait pas connu une année particulièrement active.

g) Rapport du Comité sur le professionnalisme

R. Charlton dépose le rapport du Comité, tel que présenté dans le numéro d'*ATMOSPHERE-OCEAN* consacré au quinzième Congrès, et ajoute que le répertoire des experts-conseils avait été distribué à 230 individus et organismes; on en préparera une deuxième édition.

h) Rapport du Comité des récompenses

J. Maybank indique que les lauréats seraient connus à l'occasion du banquet.

i) Rapport du Comité des distinctions

J. Maybank souligne qu'aucune distinction ne sera décernée cette année.

j) Rapport de l'archiviste de la Société

M. Thomas rapporte qu'on procède actuellement au catalogage des documents historiques de la Société.

G. McKay, appuyé par R. Asselin, propose l'acceptation des rapports annuels. MOTION ADOPTÉE.

5. Rapports annuels des centres locaux et des sections

Après que plusieurs centres et sections eurent rapidement résumé leurs activités, E. Lozowski, appuyé par R. Asselin, propose l'adoption des rapports. MOTION ADOPTÉE.

6. Rapports annuels des groupes d'intérêts spéciaux

J. Reid dépose le rapport du groupe de la pollution atmosphérique, tel que présenté dans le numéro d'*ATMOSPHERE-OCEAN* consacré au quinzième Congrès, et relate brièvement les activités entreprises.

G. Schaefer traite du groupe de l'hydrologie, et fait remarquer que le mandat de ce groupe est similaire à celui du groupe de la pollution atmosphérique.

J. Powell, appuyé par J. Kotylak, propose l'adoption des rapports. MOTION ADOPTÉE.

7. Budget pour 1981 et prévisions budgétaires pour 1982

R. Angle dépose les données budgétaires telles que présentées dans le numéro d'*ATMOSPHERE-OCEAN* consacré au quinzième Congrès; il signale que la situation semble favorable en 1981, mais qu'on devra réduire certaines dépenses en 1982 si nous ne recevons pas la subvention du CRSNG.

G. McKay, appuyé par R. Asselin, propose l'adoption du budget. MOTION ADOPTÉE.

8. Propositions du Conseil

a) Frais de sociétariat et d'abonnement pour 1982

R. Angle, appuyé par G. McKay, propose que les frais restent au même niveau, sauf pour les abonnements annuels des institutions qui seraient portés à \$50 en 1982. MOTION ADOPTÉE.

b) *Modification des règlements*

RÈGLEMENT 6 (j)

Après avoir traité du rapport déposé par le Comité du professionnalisme, abordé les aspects professionnels et académiques du rôle de la Société et discuté de la nécessité de protéger l'intérêt public, R. Charlton, appuyé par R. Angle, propose l'adoption du règlement 6(j) (annexe 1). MOTION ADOPTÉE.

RÈGLEMENT 16

Après une longue discussion, R. Charlton, appuyé par R. Angle, propose l'adoption du règlement 16 (annexes 1 et 2). MOTION REJETÉE.

B. Boville propose qu'on remercie le Comité.

c) *Membres associés*

C. McLeod discute de l'éventuelle acceptation de membres associés au sein de la Société. Après une brève discussion concernant les aspects financiers d'une telle mesure sur la circulation d'*ATMOSPHERE-OCEAN*, C. McLeod, appuyé par P. Kociuba, propose que soit créée pour une période d'essai de deux ans une nouvelle classe de membres, qu'on appellerait membres associés; pendant cette période, aucun membre actuel ne pourrait s'inscrire à titre de membre associé. Les membres associés jouiraient de tous les droits et privilèges de sociétaires ordinaires, mais ils ne recevraient pas le publication *ATMOSPHERE-OCEAN*, et ils ne pourraient pas siéger au Conseil ni présider un Conseil national. En outre, ils n'auraient pas le droit de vote pendant l'assemblée générale annuelle. MOTION ADOPTÉE.

9. *Prochains Congrès*

Congrès de 1982

L. O'Quinn, président du Comité des arrangements locaux pour le Congrès de 1982, fait le point sur les préparatifs et rappelle que le Congrès aura pour thème *La glace de mer*.

Congrès de 1983

Le Congrès de 1983 aura lieu au Centre de l'Alberta.

Congrès de 1984

Le Centre d'Halifax a offert d'accueillir le Congrès de 1984.

Le Bureau d'administration accepte de prendre en considération une demande de G. Bristow, qui désire que le Congrès soit tenu deux ou trois semaines plus tard dans l'année, à l'avenir.

10. *Autres questions*

Aucune autre question n'a été discutée.

11. *Rapport du Comité de mise en candidature*

J. Powell, appuyé par P. LeBlond, propose l'adoption des candidatures concernant la composition du Conseil 1981-1982, telles que présentées dans le numéro d'*ATMOSPHERE-OCEAN* consacré au quinzième Congrès. MOTION ADOPTÉE.

12. *Mise en fonction des membres du Bureau d'administration pour 1981-1982*

On présente et installe les membres du nouveau Conseil d'administration. E. Lozowski, en sa qualité de nouveau président, remercie les membres de l'ancien Conseil d'administration ainsi que les membres sortants des Comités, et souhaite la bienvenue aux nouveaux membres.

R. Bennett, appuyé par J. Reid, propose la levée de l'assemblée à 23 h.

J.H. Renick
Secrétaire d'assemblée

Annexe 1

AVIS DE MOTION DU CONSEIL PROJETS DE MODIFICATION AUX RÈGLEMENTS POUR 1981

RÈGLEMENT 6

j) Un Comité sur le professionnalisme sera établi pour promouvoir les idéaux professionnels de la formation personnelle, de la responsabilité, de la conscience, de l'auto-discipline et de la maturité professionnelle, pour relever le prestige des météorologues et des océanographes, et pour encourager le développement d'applications industrielles et environnementales dans les domaines de la météorologie et de l'océanographie. Le Comité sera formé d'un président et d'au moins quatre autres membres, nommés par le Conseil et représentant les intérêts particuliers du Gouvernement fédéral, des gouvernements provinciaux, des universités, des industries et des bureaux de consultation. Les membres pourront siéger au Comité pendant une période maximum de trois ans. Le Comité se réunira au moins une fois par année et présentera au Conseil un rapport annuel sur les activités.

RÈGLEMENT 16 – Code d'éthique

- a) La Société se dotera d'un code d'éthique professionnelle pour maintenir la dignité, l'honneur et la crédibilité des professions météorologiques et océanographiques, pour protéger l'intérêt du public et pour promouvoir l'avancement des sciences atmosphériques et océaniques, de façon à contribuer au mieux-être de la Société.
- b) Le code d'éthique, tel qu'approuvé par le Conseil, sera annexé au présent règlement (annexe 2). Les modifications entreront en vigueur 12 mois après la date à laquelle ils auront été approuvés par le Conseil.
- c) Le cas présumé de violation du code d'éthique feront l'objet d'une enquête approfondie du Comité sur le professionnalisme, qui fera ensuite rapport au Conseil.
- d) Seul le Conseil, après avoir reçu le rapport et les recommandations du Comité sur le professionnalisme, peut prendre des mesures disciplinaires à la suite d'une violation du code d'éthique.

Annexe 2 – Code d'Éthique

PRÉAMBULE AU CODE D'ÉTHIQUE

La majorité des membres de la Société canadienne de météorologie et d'océanographie (SCMO) sont professionnellement engagés dans plusieurs aspects des sciences météorologiques et océanographiques. Même si la SCMO constitue une société savante, ses membres et son conseil d'administration sont convaincus qu'ils peuvent exercer leur profession en conformité du code d'éthique suivant.

ESPRIT DU CODE D'ÉTHIQUE

La SCMO reconnaît que l'éthique professionnelle repose sur l'intégrité et sur la volonté de contribuer à l'avancement des connaissances et au mieux-être de l'humanité. Le professionnel doit s'inspirer en tout temps de ce principe.

DEVOIRS DU PROFESSIONNEL ENVERS LE PUBLIC

Le membre professionnel de la SCMO:

1. tentera d'inculquer au public une connaissance des sciences météorologiques et océanographiques chaque fois que la chose s'avère utile;
2. s'efforcera de tenir à jour ses connaissances pour mieux informer le public;
3. se basera sur des principes scientifiques judicieux et appliqués d'une façon scientifique, et emploie les meilleures méthodes, techniques et données disponibles;
4. n'entreprendra que les travaux qu'il peut réaliser avec compétence;

5. dirigera vers les personnes qualifiées les demandes de services qui excèdent ses capacités ou compétences professionnelles;
6. n'acceptera le crédit que des travaux exécutés ou préparés sous sa conduite personnelle;
7. refusera de s'associer à des entreprises contraires à l'intérêt public ou parrainées par des personnes d'une intégrité douteuse;
8. s'abstiendra de prononcer, au sujet de questions d'incidence publique, des déclarations inspirées ou rétribuées par des intérêts privés ou gouvernementaux, sauf s'il indique au nom de qui il fait ces déclarations.

DEVOIRS DU PROFESSIONNEL ENVERS LA SCMO ET SES MEMBRES

Un professionnel membre de la SCMO:

9. travaillera continuellement à améliorer la compétence, la dignité et le prestige de la pratique professionnelle de la Météorologie et de l'Océanographie
10. reconnaîtra que la profession est nécessaire dans les secteurs privé comme public et que le code d'éthique s'applique également à l'un et l'autre secteurs
11. aura des relations équitables et de bonne foi avec ses collègues professionnels
12. participera autant que possible aux réunions scientifiques, et tentera de publier ses résultats d'études et de recherches dans les publications de la SCMO ou dans d'autres média appropriés
13. n'essayera pas de supplanter un autre membre professionnel de la SCMO après que des gestes décisifs eussent été pris en vue de son emploi
14. ne sollicitera pas en connaissance de cause les clients d'un membre professionnel de la SCMO
15. n'utilisera pas les avantages d'une position salariée pour exercer une concurrence déloyale à un membre professionnel de la SCMO
16. avisera la Comité sur le professionnalisme de la SCMO, s'il soupçonne un membre d'agir à l'encontre de ce code d'éthique

DEVOIRS DU PROFESSIONNEL ENVERS SON CLIENT OU SON EMPLOYEUR

Une professionnel membre de la SCMO:

17. sera agent et administrateur fidèle des intérêts de ses clients ou employeurs
18. n'acceptera de rémunération que pour les services ou opinions que ses qualifications présentes lui permettent de fournir
19. taira les informations confidentielles dont le charge un employeur ou un client
20. n'entreprendra rien qui puisse susciter un conflit d'intérêts avec ses clients ou employeurs, sans que ceux-ci soient parfaitement informés
21. évitera les énoncés et prétentions exagérés et injustifiés
22. indiquera clairement à ses clients et employeurs, les conséquences à prévoir, si d'autres autorités renversent son jugement professionnel

CMOS PRESIDENT'S REPORT

Overview

The year 1981 saw the Society undertake several new initiatives – a new standing committee, a new special interest group, a new Centre, a new type of membership, and a new permanent office. It was also a year of successful activity in more traditional areas – the Congress, *ATMOSPHERE-OCEAN*, the *Newsletter*, the Speaker's Tour, to name but a few.

This is not a time to be complacent, however, as much remains to be done – establishing the permanent office on a sound footing, augmenting membership, enhancing our public visibility, serving new communities such as high school students, operational meteorologists, hydrologists and others, while at the same time keeping the machinery that we already have in place, well oiled and working.

As outgoing President, may I thank you all for your involvement in the Society this past year, and wish the Society all success in its future endeavours. Thanks are also due to AES and NSERC, whose generous grants have permitted the Society to continue and to expand its diverse activities, in support of the advancement of meteorology and oceanography in Canada.

National Executive and Council

Council membership during 1982 consisted of the Chairmen of the Local Centres and:

	<i>Before 15th Congress</i>	<i>After 15th Congress</i>
Past-President	John Powell	John Maybank
President	John Maybank	Edward Lozowski
Vice-President	Edward Lozowski	Richard Asselin
Treasurer	Randy Angle	Randy Angle
Corresponding Secretary	Peter Kociuba	Peter Kociuba
Recording Secretary	Jim Renick	Carr McLeod
Councillors-at-Large	Howard Freeland	Robert Benoit
	David Huntley	Peter Jones
	John Mills	Leo O'Quinn

The Executive, consisting of the President, Vice-President, Treasurer, Corresponding Secretary and Recording Secretary, met six times during the year, while Council convened thrice. Unfortunately, the Society's limited budget precluded the attendance of many of the Councillors at the meetings. The minutes of these meetings are available for inspection from the Recording Secretary. They will be kept permanently by the Society's Archivist, Morley Thomas.

The year 1981 marked the third year of residence of the Executive in "Edmonton". The nomination of Dr Asselin as Vice-President was made with a view to moving the Executive to "The Ottawa Region" in 1982, and to once again involving the oceanographic community in the management of the Society.

The Permanent Office of the Society moved during the year, down one floor to Suite 805, 151 Slater Street, Ottawa, Ontario, K1P 5H3 (phone: 613-237-3392). We are continuing to share the facilities of the Canadian Association of Physicists who are providing their office services on a cost-recovery basis to the Society. Until the fall of 1981, these services involved primarily acting as a clearinghouse for incoming mail to the Society. However, at its October meeting, Council decided to assume from the University of Toronto Press all responsibilities related to *ATMOSPHERE-OCEAN*, except for the actual printing and mailing. This step was the culmination of a move by the Society towards the handling of its own membership affairs. The benefits of this step to the Society will be a greater degree of control over and availability of the membership list, and the ability to plan and invest our own membership fee income (last year we received no interest from the University of Toronto Press on the fees collected by them on our behalf). There will, however, be a correspondingly greater degree of administrative responsibility placed upon the Society, which it is expected that the Permanent Office will be able to assume. This year, membership renewal notices were sent out by the Corresponding Secretary while the returned renewal forms and the banking of cheques were handled by Mona Jento and the staff of the Permanent Office. It is anticipated that next year this procedure will be computerized.

Beyond this, the Permanent Office will handle the renewal of institutional subscriptions to *ATMOSPHERE-OCEAN*, the warehousing of back issues, the handling of special requests and so on. In order to assist the office in the discharge of its responsibilities, it may be necessary to split the Corresponding Secretary's duties in future, putting membership affairs in the hands of a Membership Secretary.

National Committees

The Society's committee structure consists of a mix of long- and short-term standing committees and ad hoc committees. The long-term standing committees (e.g. the Scientific Committee), consist of members who are nominated largely by the committee itself and are appointed by Council. Their membership is normally subject to a specified rotation sequence and each member serves for a period of several years. The short-term standing committees (e.g. the Nominating Committee; the Congress Scientific Programme Committee) are normally appointed by Council each year for a specific purpose. Ad hoc committees (e.g. the Permanent Office Implementation Committee) are appointed by Council for a specific purpose and then disbanded.

Membership and details of the committee activities can be found in their annual reports (Congress Issue of *ATMOSPHERE-OCEAN*). Here are a few noteworthy highlights for 1981.

The Annual General Meeting gave approval to a By-Law amendment to formally establish a standing Committee on Professionalism. This committee had formerly been in existence for several years as an ad hoc committee. It has been a very active committee under the Chairmanship of Bob Charlton. In December 1980 it published the first edition of *The Directory of Consultants in Meteorology and Oceanography*, which was widely distributed and sought after during 1981. The committee is also working closely with the Local Centres in order to try to formulate an acceptable Code of Ethics for the Society.

A brand new standing committee is the Education Committee for Meteorology. Following an organizational meeting held at the Congress, the committee met for the first time at McGill University in November, under the chairmanship of Tim Oke. Charged with reviewing all matters related to the education and employment of professional meteorologists, the committee has started its work by sending out a questionnaire to universities and employers. It is expected that this committee, like the Scientific Committee, will require a budget of about \$4,000 in order that its members, who are scattered across the country, can get together at least once, and preferably twice during the year. The Council hopes that these funds can be made available without imposing an undue burden upon the membership, by an increase in subvention income, and by contributions from the employers of the committee members where appropriate.

Following a recommendation at Congress of the Prizes and Awards Review Committee, a new permanent Prizes and Awards Committee has been established, which will assume the functions of the former Prizes and Awards and Citations Committees. This Committee will have greater continuity than its predecessors, its responsibility will be wider, including for example CMOS involvement in Science Fairs, and it will relieve the Corresponding Secretary of the burden of attending to the administrative details of the Society's awards. The new committee, presently under the chairmanship of David Farmer, will also be administering a new award – the CMOS Prize for Applied Oceanography.

The Public Information Committee, under the chairmanship of Joe Kotylak, has completed its revision of the occupational monograph on the Meteorologist. This brochure was published in September by the Guidance Centre of the Faculty of Education of the University of Toronto, to inform high school students and career counsellors of the nature of meteorology as a career. The Society has received 500 free copies of the brochure as a reimbursement for the services of the Public Information Committee, and these will be distributed in response to enquiries about meteorological careers.

Another innovation adopted this year is the recommendation of the Membership Committee to introduce a new category of "associate membership". It is expected that this category will be attractive to potential members who do not desire full membership privileges at the national level, and who find the saving of 50% of the membership fee attractive. The intention in establishing this category is to attract new members in allied fields (e.g. environmental engineers) who might wish to associate themselves with a Special Interest Group. It was not intended to be a way of establishing regular membership at a discount price, and for this reason existing members are presently barred from switching to this new category.

Local Centres and Special Interest Groups

The total Centre- or Chapter-affiliated membership in the Fall of 1981 was 693, down marginally from 1980. In addition, there were about 80 members, mostly abroad, who were not associated with a Local Centre. Subventions totalling \$3015.50 were disbursed to the Centres and Chapters in 1981 to support their activities. The latter consisted largely of holding local meetings, but also included such activities as support of science fairs, high school lectures, public displays, participation in regional committees (environmental advisory committees, for example), and the sponsoring of local conferences.

Congratulations are in order to the Newfoundland Chapter which successfully petitioned Council in 1981 to become the Newfoundland Centre. This leaves the Society with twelve Centres and only one Chapter.

The annual AES/CMOS lecture tour was undertaken this year by Bill Emery who spoke on "Satellite Remote Sensing and its Applications to Oceanography and Meteorology", and by Geoff Austin whose topic was: "Combining Satellite and Radar Data for the Short-Range Forecasting of Precipitation". The division of the tour into two sections this year was a novel feature. It certainly eased the load on the speakers, and made it possible to complete the tour over a shorter period.

The Andrew Thomson lecture was delivered in March 1981 at the University of Toronto by Dr A.C. Wiin-Nielsen, Secretary-General of the World Meteorological Organization. His lecture, entitled "Prediction and Predictability of Weather and Climate", was well received by a large audience. The Society, as a cosponsor of the lecture with the University, will be publishing the text in *ATMOSPHERE-OCEAN* 19(3).

The Air Pollution Special Interest Group of the Society (APSIG), under the chairmanship of John Reid, has led a very active year. Among other things, it organized special sessions at the 15th Congress, and subsequently published the proceedings of these sessions. This was done on a cost-recovery basis at no charge to the Society. APSIG has also begun to publish its own newsletter, the *APSIG UPDATE*.

A petition to form a second Special Interest Group in Hydrology (HYSIG) was received at Congress and approved by Council. This action complements the initiative of the Editorial Committee of *ATMOSPHERE-OCEAN*, who have agreed, in response to a proposal from the NRC Associate Committee on Hydrology, to open the pages of *ATMOSPHERE-OCEAN* to suitable papers in physical hydrology. Gary Schaefer is the Chairman of HYSIG.

Since the notion of special interest groups was adopted on a two-year trial basis in 1980, it is expected that a review of special interest groups will be undertaken at the 1982 congress. It remains to be seen whether the new "associate membership" category will be of interest to SIG members who are not as yet members of the Society.

National Congresses

The 15th Congress admirably hosted by the Saskatchewan Centre, was held on the campus of the University of Saskatchewan at Saskatoon, May 26-29. The conference theme was Hydrometeorology, and Mr J.P. Bruce, Assistant Deputy Minister, Environment Canada, gave the keynote address. A special air pollution session on long-range pollution transport was also organized. In all, 124 papers were accepted and presented in 25 sessions, including one quite successful poster session. Five of the sessions were oceanographic - a goodly number considering the location of the conference! A total of 165 registrants attended the conference, 159 of these being members of the Society. Eight exhibits afforded members the opportunity to view some of the latest commercial equipment, while providing (at \$350 per display) a significant source of revenue for the conference. Partly as a result of these, and partly because of the careful planning and execution of the conference, the local arrangements committee under the leadership of Jeff Whiting, was able to return to the Society a profit on the congress of about \$6000. It should be mentioned that this amount represents a profit only in the sense that the cost of the Congress Issue of *ATMOSPHERE-OCEAN* (about \$6000) is not normally ascribed to the Congress itself. The success of the local arrangements committee in covering this expense this year, will we hope be an inspiration to future Congress organizers to do likewise.

At the end of the year, plans for the 1982 Congress, to be hosted by the Ottawa Centre, were well underway. Alberta is the tentative location of the 1983 Congress, subject to confirmation at the 1982 Annual General Meeting, while the Halifax Centre has expressed an interest in hosting the 1984 Congress.

CMOS Publications

At the end of the year, *ATMOSPHERE-OCEAN* was somewhat behind its normal publication schedule, owing in large part to the loss of an entire issue's manuscripts and figures by Air Canada. Volume 19, Numbers 1 and 2 have appeared, while Numbers 3 and 4 are expected to appear in January and March 1982, respectively. The thirteen papers that have appeared so far in Volume 19 maintain the high standard that we have come to expect of *ATMOSPHERE-OCEAN*, while reflecting a heterogeneous mix of University, private industry, government, domestic and foreign authorship.

As a result of the Council decision to open *ATMOSPHERE-OCEAN* to suitable papers in physical hydrology, the Editor, Henry Leighton, has added two Associate Editors, experienced in hydrology and hydrometeorology, to the Editorial Committee. This step will help to maintain an appropriate cross-section of disciplinary representation on the committee.

In 1981, the Society took a number of steps related to the financing of *ATMOSPHERE-OCEAN*. An NSERC publication grant of \$4200, applied for in 1980, was received in early 1981. Because NSERC policy in reviewing these grant applications now requires an audited financial statement of the journal, Council has decided to maintain separate books for *ATMOSPHERE-OCEAN* beginning in 1982. In order to do this, half of the regular membership fee will be allotted to *ATMOSPHERE-OCEAN*. This figure is based on actual costs and is in line with the policy of other NSERC subsidized journals. It is also in keeping with the fact that the new associate membership fee, which does not include a subscription to *ATMOSPHERE-OCEAN*, is half of the regular membership fee. Council was also advised during the year that the NSERC publication grant programme is now viewed as ongoing support, rather than as a one-time subsidy. Consequently, the Society re-applied towards the end of the year for a \$6600 NSERC grant, and expects to continue this policy for the foreseeable future.

In order to generate still further revenue for *ATMOSPHERE-OCEAN* and to possibly reduce costs, the Editorial Committee formed two subcommittees: the first to locate and solicit advertisers, and the second to review possible alternative printers to the University of Toronto Press. The first committee is still deliberating, while the recommendation of the second committee was to stay with the University of Toronto Press until such time as the Permanent Office is able to routinely handle journal subscription and membership renewals. Once this matter is in hand, however, the Alternative Printer Committee suggested that a significant cost saving could probably be effected by switching to a very reputable but less expensive printing firm in Ottawa.

Another innovation related to *ATMOSPHERE-OCEAN* is the appointment of Ed Truhlar as the Editor of the Congress Issue. This step will ease the burden on the Editor, while ensuring, with the cooperation of those members responsible for annual reports, that the Congress issue is available somewhat ahead of the Congress itself.

The *Newsletter* has also continued to grow in 1981, under the Editorship of Av Mann. His co-location with the Executive, along with his ability and willingness to sit through Executive and Council meetings, have enabled him to keep abreast of Society activities and to keep the *Newsletter* newsworthy.

The *Newsletter* appeared six times in 1981, being printed in and distributed from Edmonton rather than by the University of Toronto Press. This procedure allowed the Editor to experiment with an improved format, and further, it insured that the *Newsletter* was sent out in a timely fashion, even during the postal strike! In order to produce mailing labels for the *Newsletter*, the Corresponding Secretary put our membership list on computer tape. This list subsequently facilitated the sending out of our own membership renewal notices.

The Society is represented by John Powell and Tim Oke on the Interim Editorial Board of the *Climatological Bulletin* (formerly the *McGill Climatological Bulletin*). The future of this publication and the extent of the Society's involvement with it are presently under deliberation.

The Society continues to offer *Chinook* magazine to those members who wish to have it. This is a privately published, popular Canadian meteorological magazine, available to CMOS members via a reduced rate bulk subscription negotiated with the Publisher.

Other Society Activities

The CMOS continues to sponsor the Youth Science Foundation, contributing \$75 annually by way of a membership fee, and a further \$100 annually as a prize for the winning exhibitor in meteorology or oceanography at the Canada-Wide Science Fair. Henry Watson of the Ottawa Centre serves as the liaison

with the YSF. In recognition of the role the Society has played as a founding and continuing member of YSF, the Society was awarded a special certificate at the Canada-Wide Science Fair held in May at the University of Waterloo. Through its Local Centres, the Society also participates in regional science fairs across the country.

Increasingly, the Society is called upon to nominate individuals to serve on various national and international committees. A summary of these committees and the Society representatives or nominees was published this year in the *Newsletter*.

Acknowledgements

A small Society such as CMOS is powered exclusively by volunteer labour. It would be impossible to name all who have expended their energies on behalf of the Society without reproducing here a significant portion of the membership list. May I offer to all who have made a contribution of their time and skills whether large or small, my heartiest thanks. To those who would have liked to serve but were not asked, may I say, don't wait for a tap on the shoulder – volunteer!

E. P. Lozowski
President

RAPPORT DU PRÉSIDENT DE LA SCMO

Tour d'horizon

Pour la Société, 1981 aura été l'année des innovations, puisque nous nous sommes dotés d'un nouveau comité permanent, d'un nouveau groupe d'étude de sujets particuliers, d'un nouveau centre local, d'un nouveau type de sociétariat et d'un nouveau bureau permanent. L'année a aussi été couronnée de succès dans les secteurs habituels, c.-à-d. dans l'organisation du Congrès, la publication d'*ATMOSPHERE-OCEAN* et du *Bulletin*, etc.

Ce n'est pas le moment de nous reposer sur nos lauriers, cependant, puisqu'il reste beaucoup à faire: raffermir les bases du bureau permanent, augmenter le nombre de sociétaires, accroître notre visibilité et servir de nouveaux publics (étudiants du secondaire, spécialistes en météorologie fonctionnelle et en hydrologie, etc.), tout en assurant la bonne marche des activités déjà entreprises.

J'aimerais, en tant que président sortant, vous remercier tous de votre apport aux travaux de la Société pendant l'année qui vient de s'écouler. Permettez-moi aussi d'exprimer ma gratitude au SEA et au CRSNG, dont les généreuses subventions ont permis à la Société de poursuivre et de développer ses multiples activités dans l'avancement de la météorologie et de l'océanographie au Canada. Je souhaite à la Société tout le succès possible dans ses futures entreprises.

Bureau national d'administration et Conseil

Le Conseil pour 1982 regroupe les présidents des centres locaux et les personnes suivantes:

	<i>Avant le 15^e Congrès</i>	<i>Après le 15^e Congrès</i>
Président sortant	John Powell	John Maybank
Président	John Maybank	Edward Lozowski
Vice-Président	Edward Lozowski	Richard Asselin
Trésorier	Randy Angle	Randy Angle
Secrétaire-correspondant	Peter Kociuba	Peter Kociuba
Secrétaire d'assemblée	Jin Renick	Carr McLeod
Conseillers	Howard Freeland	Robert Benoit
	David Huntley	Peter Jones
	John Mills	Leo O'Quinn

Le Bureau d'administration, formé du président, du vice-président, du trésorier, du secrétaire-correspondant et du secrétaire d'assemblée, s'est réuni six fois pendant l'année, tandis que le Conseil a été convoqué en trois occasions. En raison du budget limité de la Société, de nombreux conseillers n'ont pu assister à ces réunions, dont on peut consulter le procès-verbal en s'adressant au secrétaire d'assemblée. Les procès-verbaux seront conservés en permanence par l'archiviste de la Société, Morley Thomas.

Il y a eu trois ans, en 1981, que le Bureau d'administration a été établi à Edmonton. Le choix de M. Asselin comme vice-président a été fait dans l'objectif d'installer le Bureau d'administration dans la région d'Ottawa en 1982, pour que la communauté océanographique puisse reprendre en mains la gestion de la Société.

Le bureau permanent de la Société est maintenant logé un étage plus bas, soit dans la pièce 805, au 151 rue Slater, Ottawa (Ontario) K1P 5H3 (le numéro de téléphone est 613-237-3392). Nous partageons toujours les installations de l'Association canadienne des physiciens, qui offre à la Société des services de bureau selon une formule de recouvrement des coûts. Ces services, jusqu'à l'automne 1981, consistaient surtout à recevoir et à distribuer le courrier adressé à la Société. Le Conseil a toutefois décidé, en octobre, d'assumer lui-même la majorité des responsabilités reliées à la publication d'*ATMOSPHERE-OCEAN*; les Presses de l'Université de Toronto ne se chargeront plus que de l'impression comme telle et de la mise à la poste. La Société, qui a décidé de régir elle-même les questions reliées au sociétariat, pourra non seulement mieux contrôler la liste des membres, mais aussi déposer et investir elle-même les frais de cotisation versés par les membres (l'année dernière, nous n'avons reçu aucun intérêt sur les sommes perçues en notre nom par les Presses de l'Université de Toronto). Le bureau permanent de la Société devrait s'acquitter sans problème de cet accroissement des responsabilités administratives. Cette année, les avis de renouvellement ont été envoyés aux sociétaires par le secrétaire-correspondant, tandis que Mona Jento et le personnel du bureau permanent ont vu à traiter les formules de renouvellement retournées et à déposer les chèques. Cette procédure devrait être informatisée dès l'année prochaine.

Par ailleurs, le bureau permanent se chargera de renouveler les abonnements des collectivités à *ATMOSPHERE-OCEAN*, d'entreposer les numéros déjà parus, de répondre aux demandes spéciales, etc. Pour aider le bureau à s'acquitter de ses responsabilités, il sera peut-être nécessaire de scinder les fonctions du secrétaire-correspondant, de façon que les questions reliées aux membres soient laissées entre les mains d'un secrétaire au sociétariat.

Comités nationaux

La Société comprend toute une gamme de comités permanents à court et à long terme, en plus de différents comités spéciaux. Dans le cas des comités permanents à long terme (par exemple le Comité scientifique), les membres potentiels sont la plupart du temps proposés par le comité lui-même, et ensuite nommés par le Conseil. Leur appartenance aux comités est habituellement fondée sur un ordre de roulement prédéterminé, et chaque membre siège au comité pour un période de plusieurs années. Les comités permanents à court terme (par exemple le Comité de mise en candidature ou le Comité de congrès chargé des programmes scientifiques) sont normalement constitués chaque année par le Conseil pour atteindre un but précis. Quant aux comités spéciaux (comme le Comité d'établissement du bureau permanent), ils sont formés par le Conseil pour réaliser une tâche donnée, après quoi ils sont dissous.

Le rapport annuel des divers comités (voir le numéro d'*ATMOSPHERE-OCEAN* consacré au Congrès) énumère les membres et les activités des comités. Voici quelques-uns des faits saillants de 1981.

Les participants à l'Assemblée générale annuelle ont approuvé la modification des règlements, pour que soit créé officiellement un Comité permanent sur le professionnalisme. Il existait déjà, pour s'occuper de cette question, un comité spécial très actif que présidait Bob Charlton. En décembre 1980, ce Comité avait publié la première édition d'un répertoire des experts-conseils en météorologie et en océanographie, qui a connu en 1981 une large diffusion et une grande popularité. De plus, le Comité collabore étroitement avec les centres locaux pour tenter de formuler un code d'éthique acceptable pour la Société.

Un tout nouveau comité permanent a été formé, soit le Comité de l'éducation en météorologie. À la suite d'une rencontre préliminaire tenue pendant le Congrès, le nouveau Comité s'est réuni pour la première fois en novembre à l'Université McGill, sous la présidence de Tim Oke. Le Comité, responsable de toutes les questions reliées à l'éducation et à l'emploi des météorologistes professionnels, a commencé ses travaux en distribuant un questionnaire aux universitaires et aux employeurs. Comme dans le cas du Comité scientifique, il faudra probablement affecter environ \$4,000 au nouveau Comité pour que ses membres,

disséminés un peu partout au pays, puissent se réunir au moins une fois – et deux si possible – pendant l'année. Le Conseil espère débloquer ces fonds sans taxer indûment les sociétaires, soit en augmentant le montant des abonnements et en demandant, le cas échéant, une contribution aux employeurs des membres du Comité.

À la suite d'une recommandation formulée pendant le Congrès par le Comité d'étude des récompenses, on créera un nouveau Comité des récompenses qui cumulera les fonctions du Comité des récompenses et du Comité des citations. Le nouveau comité jouira de responsabilités plus étendues que ses prédécesseurs: il s'occupera par exemple de la participation de la SCMO aux expositions scientifiques, et il soulagera le secrétaire-correspondant des détails administratifs reliés aux prix décernés par la Société. Le nouveau comité, actuellement présidé par David Farmer, attribuera une nouvelle récompense dans le domaine de l'océanographie appliquée.

Le Comité permanent d'information publique, sous la présidence de Joe Kotylak, a fini la révision de la monographie sur la profession de météorologiste. Cette brochure a été publiée en septembre par le Centre d'orientation de la faculté d'éducation de l'Université de Toronto, pour informer les étudiants et les conseillers en orientation du niveau secondaire sur les fonctions du météorologiste. Comme remboursement des services rendus par le Comité d'information publique, la Société a reçu gratuitement 500 exemplaires de cette brochure. On les distribuera aux personnes demandant des renseignements sur les carrières en météorologie.

Autres faits saillants à noter: l'adoption d'une proposition du Comité d'éligibilité des membres, concernant la création d'une nouvelle catégorie de membres, qu'on appellerait membres associés. Cette nouvelle catégorie devrait intéresser les personnes qui ne désirent pas obtenir la totalité des privilèges accordés aux membres à l'échelle nationale. La nouvelle catégorie, pour laquelle les frais de cotisation seront de 50% moins élevés que pour les membres ordinaires, a été créée pour attirer les personnes travaillant dans des domaines connexes (par exemple en technologie de l'environnement) et désirant faire partie d'un groupe d'étude de sujets particuliers. Il ne s'agit pas de permettre aux membres ordinaires de continuer à faire partie de la Société à prix d'aubaine; pour cette raison, les sociétaires actuels ne peuvent pour l'instant s'inscrire à titre de membres associés.

Centres locaux et groupes d'étude de sujets particuliers

À l'automne 1981, on comptait 693 membres affiliés à un centre local ou à une section, soit une légère baisse par rapport à 1980. De plus, environ 80 membres – vivant pour la plupart à l'étranger – n'étaient associés à aucun centre local. Les centres et les sections ont reçu des subventions totalisant \$3,015.50 en 1981, à l'appui de leurs activités: tenue de rencontres locales, aide à des expositions scientifiques, conférences dans des écoles secondaires, expositions publiques, participation à des comités régionaux (par exemple des comités consultatifs pour des questions environnementales) et parrainage de conférences locales.

Toutes nos félicitations à la Section de Terre-Neuve, qui a accédé en 1981 au statut de Centre de Terre-Neuve. La Société compte maintenant 12 centres locaux et une seule section.

Les conférences annuelles SEA-SCMO ont été inaugurées cette année par Bill Emery, qui a traité de la télédétection par satellite et ses applications en océanographie et en météorologie, ainsi que par Geoff Austin qui parlé de la combinaison des données obtenues par satellite et par radar dans la prévision à court terme des précipitations. Cette année, le fait de diviser en deux le circuit des conférences a allégé la charge de travail des orateurs, et a permis à ceux-ci de boucler le circuit en moins de temps.

L'Université de Toronto a été le théâtre en mars 1981 de la conférence *Andrew Thomson*, prononcée par M. A.C. Wiin-Nielsen, secrétaire général de l'Organisation météorologique mondiale. Son allocution, portant sur la prévision et la prévisibilité du temps et du climat, a été fort appréciée par un auditoire nombreux. La Société, qui était co-parrain de cette conférence avec l'Université, en publiera d'ailleurs le texte dans le numéro 19(3) d'*ATMOSPHERE-OCEAN*.

Le groupe d'étude de sujets particuliers responsable de la pollution de l'air, présidé par John Reid, a été très actif. Entre autres réalisations, il a organisé plusieurs sessions spéciales pendant le 15^e Congrès, et ultérieurement publié les actes de ces sessions. Tout cela a été fait selon une formule de recouvrement des frais et n'a rien coûté à la Société. Par ailleurs, ce groupe d'étude de sujets particuliers publie maintenant son propre bulletin d'information.

La demande concernant la création d'un deuxième groupe d'étude de sujets particuliers en hydrologie, présentée à l'occasion du Congrès, a été approuvée par le Conseil. Cette mesure complète l'initiative du Comité de rédaction d'*ATMOSPHERE-OCEAN*, qui a accepté – à la demande du Comité associé de l'hydrologie du CNR – de publier dans *ATMOSPHERE-OCEAN* des articles sur l'hydrologie physique. C'est Gary Schaefer qui préside le groupe d'étude de sujets particuliers en hydrologie.

Puisque le principe des groupes d'étude de sujets particuliers n'a été adopté en 1980 que pour une période d'essai de deux ans, les participants au Congrès de 1982 devront sans doute réexaminer cette question. Il reste à déterminer si la nouvelle catégorie de "membres associés" intéressera les personnes qui, tout en faisant partie de groupes d'étude de sujets particuliers ne sont pas membres de la Société.

Congrès nationaux

Le 15^e Congrès, admirablement organisé par le Centre local de la Saskatchewan, s'est tenu du 26 au 29 mai au campus de l'Université de la Saskatchewan, à Saskatoon. Le Congrès avait pour thème l'hydrométéorologie; c'est M. J.P. Bruce, sous-ministre adjoint d'Environnement Canada, qui a prononcé l'allocation d'ouverture. On a aussi organisé une session spéciale sur le transport à distance des polluants. En tout, on a accepté 124 présentations, lesquelles ont été communiquées en 25 sessions, dont une session d'affichage particulièrement remarquée. Cinq des sessions étaient consacrées au domaine océanographique, ce qui constitue une proportion remarquable vu la région où avait lieu le Congrès! Un total de 165 personnes ont assisté au Congrès, dont 159 membres de la Société. On y a retrouvé huit stands d'exposition qui, tout en permettant aux membres d'examiner le plus récent matériel commercial, ont constitué une importante source de revenus (\$350 par stand). En partie grâce à ces fonds, mais aussi en raison d'une planification judicieuse et d'une organisation soignée, le Comité des arrangements locaux, dirigé par Jeff Whiting, a pu remettre à la Société une somme d'environ \$6,000, constituant les profits du Congrès. À noter que le coût du numéro d'*ATMOSPHERE-OCEAN* consacré au Congrès (c.-à-d. aux alentours de \$6,000) n'est habituellement pas imputé au Congrès lui-même. Souhaitons que les comités organisateurs des futurs Congrès puissent répéter le succès financier de cette année.

Les préparations pour le Congrès de 1982, organisé par le Centre local d'Ottawa, étaient déjà bien engagées à la fin de l'année. Le Congrès de 1983 devrait avoir lieu en Alberta (cela reste à être confirmé par l'Assemblée générale annuelle de 1982), tandis que le Centre local d'Halifax s'est déclaré intéressé à organiser le Congrès de 1984.

Publications de la SCMO

À la fin de l'année, on constatait un léger retard dans le calendrier de publication d'*ATMOSPHERE-OCEAN*, principalement en raison de la perte – par Air Canada – de tous les manuscrits et de toutes les données d'un numéro. Les numéros 1 et 2 du volume 19 ont été publiés, tandis que les numéros 3 et 4 devraient paraître en janvier et mars 1982 respectivement. Les treize articles jusqu'à maintenant publiés dans le volume 19, tout en respectant les hautes normes de qualité associées à *ATMOSPHERE-OCEAN*, sont l'oeuvre d'universitaires, de représentants du secteur privé et du Gouvernement, et de spécialistes canadiens et étrangers.

Pour faire suite à la décision du Conseil de publier dans *ATMOSPHERE-OCEAN* des articles sur l'hydrologie physique, deux rédacteurs-adjoints spécialisés respectivement en hydrologie et en hydrométéorologie se joindront au Comité de rédaction dirigé par Henry Leighton. On pourra ainsi mieux assurer l'approche pluridisciplinaire du Comité.

En 1981, la Société a adopté certaines mesures concernant le financement d'*ATMOSPHERE-OCEAN*. Nous avons reçu du CRSNG, en 1981, la subvention de \$4,200 que nous avions demandée en 1980 pour aider à la publication d'*ATMOSPHERE-OCEAN*. Puisque le CRSNG exige maintenant un état financier vérifié concernant la publication pour laquelle une demande de subvention est présentée, le Conseil a décidé de tenir des comptes distincts pour *ATMOSPHERE-OCEAN* à partir de 1982. À cette fin, la moitié des frais de cotisation des membres ordinaires sera affectée à *ATMOSPHERE-OCEAN*. Ce montant est fondé sur les coûts réels, et correspond à la politique des autres publications subventionnées par le CRSNG. On a aussi tenu compte du fait que les frais de cotisation des nouveaux membres associés n'incluent pas l'abonnement à *ATMOSPHERE-OCEAN* et représentent 50% des frais demandés aux sociétaires ordinaires. Le Conseil a aussi appris que le CRSNG fait maintenant de ses subventions aux publications un programme d'aide permanent, et non plus une aide ponctuelle. La Société a donc présenté vers la fin de l'année une nouvelle demande de subvention au CRSNG, de l'ordre de \$6,600 cette fois. On prévoit procéder de cette façon dans les années à venir.

Pour accroître les recettes d'ATMOSPHERE-OCEAN et éventuellement en réduire les coûts, le Comité de rédaction a formé deux sous-comités: le premier pour trouver des annonceurs, et le second pour chercher un imprimeur plus approprié que les Presses de l'Université de Toronto. Le premier comité n'a pas terminé ses discussions, tandis que le second comité a recommandé qu'on s'en tienne aux Presses de l'Université de Toronto jusqu'à ce que le bureau permanent puisse s'occuper sans problème du renouvellement des souscriptions des institutions et des cotisations. Ce comité a cependant indiqué qu'une fois cette question réglée, des économies appréciables pourraient probablement être réalisées en donnant le contrat à une imprimerie d'Ottawa tout aussi réputée mais demandant un prix moins élevé.

Il est à noter qu'Ed Truhlar a été nommé rédacteur en chef du numéro d'ATMOSPHERE-OCEAN consacré au Congrès; cela facilitera la tâche au rédacteur en chef d'ATMOSPHERE-OCEAN, tout en permettant d'assurer – avec la collaboration des membres chargés de la préparation des rapports annuels – que le numéro consacré au Congrès paraîtra avant la tenue de Congrès lui-même.

La situation du *Bulletin* de la SCMO a continué à s'améliorer en 1981, sous la direction de M. Av Mann. Le fait que M. Mann travaille non loin des locaux du Bureau d'administration, et qu'il n'hésite pas à assister aux réunions du Bureau d'administration et du Conseil, lui permet d'être au courant des activités de la Société et de produire un *Bulletin* d'une qualité toujours meilleure.

Il y a eu six numéros du *Bulletin* en 1981, et l'impression et la distribution ont été confiées à une firme d'Edmonton plutôt qu'aux Presses de l'Université de Toronto. De cette façon, le rédacteur en chef du *Bulletin* a pu donner un nouveau format au *Bulletin*, qui a pu être distribué sans retard, même pendant la grève des Postes! Le secrétaire-correspondant a informatisé la liste des membres de la Société, ce qui a permis de produire des étiquettes-adresses pour la distribution du *Bulletin*. Nous avons nous-mêmes employé cette liste pour envoyer aux membres leur avis de renouvellement de cotisation.

John Powell et Tim Oke représentent la Société au sein du comité intérimaire de rédaction du *Climatological Bulletin* (anciennement le *McGill Climatological Bulletin*). L'avenir de cette publication, de même que la participation de la Société à celle-ci, font actuellement l'objet de discussions.

La Société continue à offrir la revue *Chinook* aux membres intéressés. Il s'agit d'une populaire revue météorologique, publiée par des intérêts privés canadiens, et que les membres de la SCMO peuvent recevoir par l'entremise d'un abonnement en gros à prix réduit, négocié avec l'éditeur.

Autres activités de la Société

La Société a continué à parrainer la Fondation sciences jeunesse, en maintenant sa cotisation annuelle de \$75 et en décernant, comme chaque année, un prix de \$100 pour le meilleur stand météorologique ou océanographique présenté à l'exposition scientifique pan-canadienne, tenue en mai à l'Université de Waterloo. C'est Henry Watson, du Centre d'Ottawa, qui sert d'intermédiaire avec la Fondation sciences jeunesse. À noter qu'à l'occasion de cette exposition, à Waterloo, la Fondation sciences jeunesse a remis à la SCMO un certificat spécial pour le rôle joué par la Société en tant que membre fondateur et permanent de la Fondation. La Société participe aussi, par l'entremise de ses centres locaux, à diverses autres expositions scientifiques un peu partout au pays.

Par ailleurs, la Société est de plus en plus souvent appelée à présenter des candidats pour siéger dans différents comités nationaux et internationaux. Le *Bulletin* a publié dans le courant de l'année le sommaire de ces comités et la liste des personnes représentant la Société ou proposées par celle-ci.

Remerciements

Pour faire fonctionner une association comme la nôtre, le travail bénévole est d'une importance vitale. Il me serait impossible, sans reproduire ici une grande partie de la liste des membres, d'énumérer tous ceux qui ont participé aux activités de la Société. Je me contenterai donc d'exprimer ma plus profonde gratitude envers tous ceux qui ont consacré du temps et des efforts à l'atteinte des objectifs de notre Société. À tous ceux qui auraient bien aimé proposer leurs services, n'attendez pas qu'on vous le demande: portez-vous volontaires.

E.P. Lozowski
Président

TREASURER'S REPORT

For the second successive year our financial situation improved significantly, with the year-end balance for 1981 showing a net gain of nearly \$9,000. In large part this is attributable to the surplus on the 1981 Congress organized by the Saskatchewan Centre. However, the year-end figures only hint at the rather complicated financial picture that existed in 1981 and that will carry on in 1982.

In the past year only three issues of *ATMOSPHERE-OCEAN* were published, instead of the usual four. The University of Toronto Press, our collection agent for many years, unilaterally introduced an "unearned income" accounting system under which we receive our money in installments tied to the issues of the current volume of the journal. We received no interest on the money held in trust. Because only 19(1) and 19(2) and the Congress Issue of *ATMOSPHERE-OCEAN* have appeared in the past year, we have received only three-fifths of the money that UTP has collected on our behalf. These and other problems with UTP prompted the decision by Council to terminate the services of UTP as our collection agent and to undertake membership and subscription renewals on our own.

The figure for Dues and Subscription income thus includes some of the early collections of 1982 subscriptions and all new memberships. A new account, number 151, was introduced for journal subscriptions, since these are now clearly identifiable. In 1983, account number 101 will contain only regular, student and associate membership dues. There will still be some difficulty, however, in identifying the residual funds at UTP.

In 1981 Council rendered the important decision that one half of membership dues should be assigned to our journal *ATMOSPHERE-OCEAN*. Together with the ability to distinguish between memberships and subscriptions afforded by our own handling, it is now possible to keep Society accounts separate from journal accounts. This will allow us to provide a properly audited statement to the Natural Sciences and Engineering Research Council in future applications for journal support.

The Society's equity resides primarily in two special purpose funds (both invested in term deposits), in two savings accounts (holding the interest earned by the funds) and a short-term deposit. The Bell Canada shares were sold for a loss of \$40.50, their value having declined steadily in recent years. While low risk, income-producing investments are appropriate for a non-profit organization like CMOS, the current high interest rates make term deposits and GIC's much more attractive than blue chip stocks.

Our equity now stands at just under \$23,000. This is close to the target of 50% of annual budget if one considers the Society's operations apart from those of the journal. However, inflation will gradually erode this position unless there are fairly regular increases. If the journal is also to have a reserve of 50% of its annual budget, then ways must be found to generate substantial surpluses.

R.P. Angle
Treasurer

RAPPORT DU TRÉSORIER

Pour la deuxième année consécutive, notre situation financière s'est améliorée sensiblement, notre solde de fin d'année 1981 étant un surplus net de près de \$9,000. Ceci est en grande partie attribuable au surplus du congrès de 1981 organisé par le Centre de la Saskatchewan. Toutefois, les chiffres de fin d'année ne laissent qu'entrevoir la situation financière plutôt compliquée qui a prévalu en 1981 et qui se perpétuera en 1982.

Au cours de l'année passée, seulement trois numéros de *ATMOSPHERE-OCEAN* ont été publiés, au lieu des quatre habituels. Notre agent de recouvrement de longue date, les Presses de l'Université de Toronto, a mis en place unilatéralement un système de comptabilisation du "revenu non gagné" en vertu duquel l'argent nous est remis en versements correspondant aux numéros du volume actuel du journal. Nous n'avons reçu aucun intérêt sur l'argent détenu en fiducie. Parce que seulement les numéros 19(1) et 19(2) ainsi que le numéro du congrès de *ATMOSPHERE-OCEAN* sont parus au cours de l'année, nous n'avons reçu que les trois cinquièmes de l'argent que les PUT a perçu en notre nom. Ce problème et d'autres aussi avec les PUT a amené le Conseil à mettre fin aux services des PUT à titre d'agent de recouvrement. Nous avons entrepris de nous occuper nous-mêmes du renouvellement des adhésions et des abonnements.

Ainsi, le chiffre des cotisations et abonnements comprend certains abonnements déjà payés pour 1982 et toutes les nouvelles cotisations des membres. Un nouveau compte, au numéro 151, a été établi pour les abonnements au journal qui sont maintenant clairement identifiables. En 1983, le compte n° 101 ne comprendra que les cotisations des membres réguliers, étudiants et associés. Nous éprouverons encore certaines difficultés, cependant, à identifier les fonds qui restent chez les PUT.

En 1981, le Conseil a pris l'importante décision d'attribuer la moitié des cotisations des membres à notre journal *ATMOSPHERE-OCEAN*. Outre la possibilité de distinguer entre les cotisations et les abonnements dont nous nous occupons nous-mêmes, il est maintenant possible de tenir des comptes distincts pour la Société et le journal. Ceci nous permettra de produire un état dûment vérifié au Conseil de recherches en sciences naturelles et en génie dans les prochaines demandes d'aide pour le journal.

L'avoir de la Société est placé en grande partie dans deux fonds spéciaux (tous deux investis dans des dépôts à terme), dans deux comptes d'épargne (ou est déposé l'intérêt provenant des fonds) et un dépôt à court terme. Les actions de Bell Canada ont été vendues à perte (\$40.50), leur valeur ayant fléchi constamment ces dernières années. Bien que les investissements générateurs de revenu à faible risque conviennent à une organisation à but non lucratif comme la SCMO, les taux d'intérêt élevés actuels rendent les dépôts à terme et les certificats de revenu garanti beaucoup plus intéressants que les actions en bourse.

Notre avoir se situe maintenant près des \$23,000, ce qui se rapproche de l'objectif des 50% du budget annuel de fonctionnement de la Société, mises à part les activités du journal. Toutefois, l'inflation fera graduellement reculer cette position à moins d'augmentation assez régulières. Pour que le journal ait également une provision de 50% dans son budget annuel, il faudra alors trouver des sources de surplus substantiels.

R.P. Angle
Trésorier

**CANADIAN METEOROLOGICAL AND OCEANOGRAPHIC SOCIETY
LA SOCIÉTÉ CANADIENNE DE MÉTÉOROLOGIE ET D'OcéANOGRAPHIE**

INCOME AND EXPENSE STATEMENT/ÉTAT DU REVENU ET DES DÉPENSES

INCOME/REVENU	1981	1980
Dues and Subscriptions/Cotisations et abonnements	\$24,831.78 ¹	\$32,655.66
AES Grant/Subvention SEA	16,000.00	16,000.00
NSERC Grant/Subvention CRSNG	4,200.00	5,500.00
Page Charges/Frais de publication	7,845.04	3,879.05
Advertising/Annonces	170.00	75.00
Interest/Intérêts	2,138.88	1,534.54
Congress/Congrès	6,605.57	0.00
Other/Divers	726.77	1,626.95
	<hr/> \$62,518.04	<hr/> \$61,271.20
EXPENDITURES/DÉPENSES		
<i>ATMOSPHERE-OCEAN</i>	\$28,468.02 ²	\$31,937.64
<i>Newsletter/Bulletin de nouvelles</i>	5,147.23	4,101.44
Collections/Commissions	4,397.44	4,182.91
Centres	3,015.50	2,888.50
Executive and Council Operations/Fonctionnement du Bureau d'administration et du Conseil	4,386.21	1,626.00
Scientific Committee/Comité scientifique	584.50	2,304.50
Other Committees/Autres comités	146.30	5.70
Prizes/Prix	745.36	980.32
Congress/Congrès	6,224.82 ³	5,159.78
Other/Divers	625.00	105.00
	<hr/> \$53,740.38	<hr/> \$52,291.79
NET GAIN/REVENU NET	<hr/> \$ 8,777.66	<hr/> \$ 7,979.41

¹ Only three-fifths of the collections by the University of Toronto Press were received because of their new unearned income accounting scheme tied to issues of the journal; some 1982 memberships and subscriptions are included /Les trois cinquièmes seulement des sommes perçues par les Presses de l'Université de Toronto sont entrées en caisse en raison d'un nouveau système de comptabilité lié aux numéros publiés. Ces revenus comprenaient quelques cotisations et abonnements pour 1982.

² Only three issues published: 18(4), 19(1) and 19(2). /Seulement trois numéros publiés: 18(4), 19(1) et 19(2).

³ Includes \$1000 advance to Ottawa Centre to host 1982 Congress /Comprend une avance de \$1000 à notre Centre d'Ottawa où se tiendra le congrès de 1982.

STATEMENT OF FINANCIAL POSITION/BILAN

ASSETS/ACTIF	1981	1980
Cash/Caisse (Royal Bank/Banque Royale)	\$ 3,929.13	\$ 5,238.59
Short-Term Deposit/Dépôt à court terme	7,000.00	0.00
Development Fund/Fonds de développement	4,633.87	4,433.87
Development Fund Interest/Intérêt du fonds de développement	3,611.40	2,675.08
Hornstein Fund/Fonds Hornstein	1,000.00	1,000.00
Hornstein Fund Interest/Intérêt du fonds Hornstein	453.75	277.15
Bell Canada Shares/Parts de Bell Canada	0.00*	720.00
Accounts Receivable/Comptes à recevoir	2,334.25	320.00
	<u>\$22,962.40</u>	<u>\$14,664.69</u>
 LIABILITIES/PASSIF		
Accounts Payable/Comptes à payer	0.00	439.45
	<u>\$22,962.40</u>	<u>\$14,225.24</u>
 SOCIETY'S EQUITY/AVOIR DE LA SOCIÉTÉ		
Equity at end of previous year/Avoir à la fin de l'année précédente	14,225.24	6,263.83
Increase from operations/Augmentation des opérations	8,777.66	7,979.41
Increase from Bell Canada Shares/Augmentation des parts de Bell Canada	(40.50)*	(18.00)
Equity at end of year/Avoir à la fin de l'année	<u>\$22,962.40</u>	<u>\$14,225.24</u>

* Bell Canada shares were sold at the end of 1981 for a loss of \$40.50./Les actions de Bell Canada ont été vendues à perte \$40.50

APPENDIX/APPENDICE

BALANCE OF EACH ACCOUNT/SOLDE DE CHAQUE COMPTE

Account Number/ Numéro de compte	Account Name/Nom de Compte	1981	1980
101	Dues and Subscriptions/Cotisations et abonnements	\$22,331.78 ¹	\$31,865.66
102	Sustaining Members/Membres de soutien	900.00	790.00
103	Grants/Subventions	16,000.00	16,000.00
104	Congress Revenue/Revenu du Congrès	6,605.57	0.00
105	Interest/Intérêts	2,074.08	1,475.50
106	Dividends/Dividendes	64.80	59.04
107	Newsletter Advertising/Annonces dans le Bulletin	170.00	75.00
108	Other/Divers	213.82	563.60
151	Subscriptions/Souscriptions (A-O*) ²	1,600.00	N/A
152	Page Charges/Frais de publication (A-O)	7,845.04	3,879.05
153	Advertising/Annonces (A-O)	0.00	0.00
154	Grants/Subventions (A-O)	4,200.00	5,500.00
155	Others/Divers (A-O)	512.95	1,063.35
202	Newsletter Production/Publication du Bulletin	3,756.60	2,275.00
203	Newsletter Distribution/Distribution du Bulletin	1,390.63	1,826.44
205	Collections/Commissions	4,397.44	4,182.91
208	Scientific Committee/Comité scientifique	584.50	2,304.50
209	Congress/Congrès	6,224.82	5,159.78
210	Centres/Centres	3,015.50	2,888.50
211	Executive and Council/Bureau d'administration et Conseil	4,386.21	1,626.00
212	Prizes and Citations/Prix et citations	745.36	980.32
219	Translations/Traduction	30.00	30.00
220	Standing Committees/Comités permanents	146.30	5.70
222	Ad hoc Committees/Comités ad hoc	0.00	0.00
224	Other/Divers	595.00	75.00
251	Printing/Impression (A-O)	23,387.22 ³	27,762.44
252	Distribution/Distribution (A-O)	1,603.45 ³	1,852.69
253	Technical Editing/Rédaction technique (A-O)	1,263.20	1,374.80
254	Translation/Traduction (A-O)	82.95	0.00
255	Overhead/Frais du fonctionnement (A-O)	2,131.20	947.71
301	Cash/Caisse	3,929.13	5,238.59
302	Short-Term Deposits/Dépôt à court terme	7,000.00	0.00
303	Development Fund/Fonds de développement	4,633.87	4,433.87
304	Development Fund Interest/Intérêt du fonds de développement	3,611.40	2,675.08
305	Hornstein Fund/Fonds Hornstein	1,000.00	1,000.00
306	Hornstein Fund Interest/Intérêt du fonds Hornstein	453.75	277.15
309	Bell Canada Shares/Parts de Bell Canada	0.00	720.00
310	Accounts Receivable/Comptes à recevoir	2,334.25	320.00
401	Accounts Payable/Comptes à payer	0.00	439.45

*ATMOSPHERE-OCEAN

¹ See footnote 1 on Statement, and paragraphs 2 and 3 of Report./Voir note n° 1 sur l'état du revenu et des dépenses et les paragraphes 2 et 3 du rapport du Trésorier.

² Collection of subscriptions directly by the Society began in the latter half of 1981. Previously this income could not be distinguished from dues./Les souscriptions ont été touchées directement par la Société durant la seconde moitié de 1981. Auparavant ce revenu ne pouvait être distingué de celui des cotisations.

³ See footnote 2 on Statement and paragraph 2 of Report./Voir note n° 2 sur l'état du revenu et des dépenses, et le paragraphe 2 du rapport du Trésorier.

BUDGET AND PROJECTED BUDGET/BUDGET ET BUDGET PROJETÉ

For the Society/Pour la Société

INCOME/REVENU	1982	1983
Memberships/Cotisations de membres ¹	\$22,380	\$31,080
Student Memberships/Cotisations d'étudiant ¹	560	930
Corporate Memberships/Cotisations de membre moral ¹	975	1,125
Associate Memberships/Cotisations de membre associé	15	140
Grants/Subventions	16,000	20,000 ²
Newsletter Advertising/Annonces dans le Bulletin	150	200
Interests/Intérêts	2,800	3,200
Congress/Congrès	1,000	1,000
Other/Divers	200	200
Collection Cost Recovery from A-O/Recouvrement des services pour A-O ⁷	1,632	1,894
Residual Funds at UTP/Sommes aux PUT	2,900	N/A
	<hr/> \$48,612	<hr/> \$59,769

EXPENDITURES/DÉPENSES³

Newsletter/Bulletin	\$ 7,000	\$ 9,500
Membership Collection/Service de cotisation ⁴	3,264	3,788
Centres	3,100	3,400
Executive and Council/Bureau d'administration et Conseil	6,5000	7,500
Committees/Comités	8,000	9,170
Awards/Récompenses	600	660
Translation/Traduction	300	330
Executive Office/Locaux d'administration ⁵	1,200	1,320
Annual Organization Publication/Publication annuelle de la Société	6,000	6,600
Other/Divers ⁶	683	863
Transfer to ATMOSPHERE-OCEAN/Transfert de fonds pour ATMOSPHERE-OCEAN ⁷	11,965	16,638
	<hr/> \$48,612	<hr/> \$59,769

¹ Based on 1981 year and memberships of 746 regular, 56 student, 13 corporate and 1 associate; fee increase of \$10 for regular members and \$5 for students and associates proposed for 1983: membership figures for 1983 estimated at 777, 62, 15 and 7, respectively./Basé sur l'année 1981 avec 746 membres réguliers, 56 membres étudiants, 13 membres moraux et 1 membre associé; dans le même ordre une projection pour 1983 prévoit les chiffres suivants: 777, 62, 15 et 7; l'augmentation des cotisations serait alors de \$10 (membre régulier) et \$5 (étudiant et associé).

² Oceanographic support expected (AES/OSS)./Support pour l'océanographie (SEA/SLO).

³ Inflation allowance of 10%; additional amounts represent growth./Taux d'inflation de 10%; les montants supplémentaires sont le résultat d'un développement.

⁴ Estimated at \$4/name in 1982 and \$4.40/name in 1983./Estimé à \$4/nom en 1982 et \$4.40/nom en 1983.

⁵ Estimated at \$100/month in 1982 and \$110/month in 1983./Estimé à \$100/mois en 1982 et \$110/mois en 1983.

⁶ Includes \$300 for *Climatological Bulletin* in 1982 and \$500 for Andrew Thomson Lecture in 1983./Comprend \$300 pour le *Bulletin climatologique* en 1982 et \$500 pour la conférence Andrew Thomson en 1983.

⁷ One half of the membership fees are allocated to the journal and therefore one half of the collection costs are charged to the journal./Une moitié des cotisations est allouée au Journal et par conséquent une moitié des dépenses pour ces cotisations incombe au Journal.

FOR ATMOSPHERE-OCEAN

INCOME/REVENU

	1982	1983
Subscriptions/Abonnements ¹	\$15,000	\$15,750
Transfer from Memberships/Finances des cotisations	11,965	16,638
Page Charges/Frais de publication	8,000	8,000
Advertising/Annonces	500	500
NSERC Grant/Subvention CRSNG	6,600	7,300
Other/Divers	500	500
Residual Funds at UTP/Sommes à UTP	10,500	N/A
	<hr/> \$53,065	<hr/> \$48,688

EXPENDITURES/DÉPENSES²

Printing/Impression	\$32,900	\$36,690
Technical Editing/Rédaction technique	2,100	2,410
Distribution/Distribution	2,500	2,750
Translations/Traduction	300	330
Editorial Committee/Comité de rédaction	2,900	3,190
Subscription Collection/Service d'abonnement	1,200	1,386
Other/Divers	33	38
Payback on membership collection/Remboursement des services	1,632	1,894
Catchup issue 19(3)/numéro 19(3)	9,500	N/A
	<hr/> \$53,065	<hr/> \$48,688

¹ Based on 1981 year-end subscriptions numbering 300. Subscription number for 1983 estimated at 315; no rate increase proposed because of \$10 increase in each of the two preceding years./Basé sur 300 abonnements à la fin de 1981 et 315 (estimation) en 1983; pas d'augmentation en 1983 mais deux augmentations de \$10 au cours des deux années précédentes.

² Inflation allowance of 10%; additional amounts represent growth due to hydrological component./Taux de 10% (inflation); les montants supplémentaires sont le résultat d'ajouts (hydrologie).

AUDITOR'S REPORT

I have examined the Statement of Financial Position of the Canadian Meteorological and Oceanographic Society as of December 31, 1981 and the related Income and Expense Statement for the year then ended. My examination was made in accordance with generally accepted auditing standards, and accordingly included such tests and other procedures as I considered necessary in the circumstances, except as noted in the following paragraph.

In common with many similar organizations, the Society reports amounts for dues and subscriptions revenue which are not susceptible of complete verification by audit procedures. Accordingly, my verification of dues and subscription revenue was limited to a comparison of recorded receipts with bank deposits.

In my opinion, except for the possibility of adjustment, had dues and subscriptions revenue been susceptible of complete verification, these financial statements present fairly the financial position of the Society as of December 31, 1981, and the results of its operations for the year then ended, in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

Edmonton, Alberta

February 10, 1982

H.B. McDonald, RIA

RAPPORT DU VÉRIFICATEUR

J'ai examiné le bilan de la Société canadienne de météorologie et d'océanographie au 31 décembre 1981 et l'état du revenu et des dépenses pour l'année se terminant à cette date. J'ai fait mon examen en respectant les normes généralement acceptées et en utilisant les essais et les autres méthodes que je considérais nécessaires dans les circonstances, excepté comme expliqué dans le paragraphe suivant.

Comme plusieurs autres organisations semblables, la Société rapporte les montants pour les revenus provenant des cotisations et des abonnements qui ne sont pas susceptibles d'une vérification complète par les procédés d'apurement. Alors ma vérification des revenus provenant des cotisations et des abonnements fut limitée à une comparaison des recettes enregistrées avec les dépôts en banque.

À mon avis, sauf pour la possibilité de corrections, si les revenus provenant des cotisations et des abonnements avaient été susceptibles d'une vérification complète, ces bilans présentent équitablement la situation financière de la Société au 31 décembre 1981 et les résultats de ses activités en 1981, conformément aux principes comptables généralement acceptés tels qu'appliqués d'une façon compatible avec celle de l'an passé.

Edmonton, Alberta
le 10 février 1982

H.B. McDonald, RIA

EDITORIAL COMMITTEE REPORT

The past year has been a very successful one for *ATMOSPHERE-OCEAN*, particularly in view of the somewhat discouraging situation prevailing at the end of 1980. In 1981 a total of 60 manuscripts were submitted for publication, a number that is significantly higher than in any previous year. Because of the very low number of submissions in 1980 publication fell behind schedule in 1981 with the last issue of volume 19 scheduled for mailing in March 1982. However, as the relatively large number of papers that are currently at various stages of the reviewing and revision process start to be received we expect that the normal publication schedule will be attained.

The Editorial Committee decided to broaden the editorial policy of the journal in order to allow publication of articles in most areas of physical hydrology. This action was supported by the Canadian Committee on Hydrology and it is hoped that this will make the journal a useful medium for a large segment of the hydrology research community. So far it is too soon to evaluate the results of this action.

The financial situation of the journal remains sound owing to the continued support of the Natural Sciences and Engineering Research Council in the form of a Scientific Publication Grant, the payment of page charges by authors employed by the Atmospheric Environment Service and Ocean Sciences and Surveys, and the contribution of voluntary page charges by most other authors. The journal is also sheltered from the recent increase in postage rates by the agreement of the Post Office to grant the journal Second Class Mail privileges. We are most appreciative of the effort exerted on our behalf by Mr John Parsons of the University of Toronto Press, which was an important factor in our ultimate success.

Finally, it is with regret that I announce that Paul LeBlond has decided to resign from his position of Deputy Editor. Paul served as an Associate Editor of *ATMOSPHERE* from 1976 to 1978, and then when *ATMOSPHERE* became *ATMOSPHERE-OCEAN* he took on the responsibilities of Deputy Editor with the prime goal of making the journal an important outlet for the publication of first rate research in physical oceanography. During the relatively short time that *ATMOSPHERE-OCEAN* has been in existence there has been a steady increase in the number of submissions of articles dealing with oceanographic subjects and it is satisfying that many of these are from outside the country. This is no doubt largely due to Paul's hard work, enthusiasm and diplomacy. I wish to express my appreciation and gratitude to Paul for his advice and help and dedication to the journal, sentiments that I am sure are shared by past editors who have worked with Paul, and indeed by all members of the Editorial Committee.

H.G. Leighton
Editor

RAPPORT DU COMITÉ DE RÉDACTION

L'année qui vient de s'achever a été extrêmement satisfaisante pour *ATMOSPHERE-OCEAN*, vu la situation quelque peu décourageante qui prévalait à la fin de 1980. Soixante manuscrits ont été soumis en 1981, soit une augmentation considérable par rapport à toute autre année. En raison du faible nombre d'articles soumis en 1980, des retards se sont produits dans la publication des numéros de 1981; le dernier numéro du volume 19 devrait être mis à la poste en mars 1982. Étant donné la quantité relativement importante d'articles actuellement engagés dans l'une ou l'autre étape du processus d'examen et de révision, on prévoit que le calendrier normal de publication pourra être respecté.

Le Comité de rédaction a décidé de permettre la publication d'articles traitant d'hydrologie physique. Cette décision, appuyée par le Comité canadien de l'hydrologie, devrait faire d'*ATMOSPHERE-OCEAN* un précieux outil de communication pour les chercheurs en hydrologie. Il est encore trop tôt pour évaluer les retombées de cette décision.

Notre publication continue d'être en bonne santé financière, grâce à la subvention permanente du Conseil de recherches en sciences naturelles et en génie, au paiement de frais de publication par les auteurs travaillant pour le Service de l'environnement atmosphérique et pour Sciences et Levés océaniques, de même qu'au versement volontaire de frais de publication par la majorité des auteurs. De plus, le ministère des Postes ayant accepté de nous faire bénéficier de la modération de port du courrier de deuxième classe, nous n'avons pas souffert de la récente augmentation des tarifs postaux. J'aimerais tout particulièrement remercier M. John Parsons, des Presses de l'Université de Toronto, qui n'a pas ménagé ses efforts.

Finalement, j'annonce avec regret que Paul LeBlond a décidé de démissionner du poste de sous-rédacteur en chef. Paul a été rédacteur adjoint d'*ATMOSPHERE* entre 1976 et 1978; lorsque notre publication a pris le nom d'*ATMOSPHERE-OCEAN*, Paul a accédé au poste de sous-rédacteur en chef dans le but principal de faire d'*ATMOSPHERE-OCEAN* un outil pour la publication de recherches de premier plan dans le secteur de l'océanographie physique. Il est encourageant de constater qu'après seulement quelques années, de plus en plus d'articles traitant du domaine océanographique, et provenant pour une bonne partie de pays étrangers, sont soumis à *ATMOSPHERE-OCEAN*. C'est là dans une large mesure le résultat de l'enthousiasme, de la diplomatie et des efforts prodigués par Paul. En mon nom personnel, au nom des autres rédacteurs en chef ayant eu le plaisir de travailler avec Paul ainsi qu'au nom de tous les membres du Comité de rédaction, j'aimerais lui exprimer toute ma gratitude pour ses conseils, son aide et son dévouement.

H.G. Leighton
Rédacteur en chef

CMOS NEWSLETTER REPORT

Publication of the CMOS Newsletter continued in the same format as established in previous years. A change in the publishing schedule resulted in combining the June and August issues.

We wish to acknowledge with thanks the support received from all members including their contributions to the Newsletter.

Avard Mann, Editor
CMOS Newsletter

BULLETIN DE NOUVELLES DE LA SCMO

La rédaction du *Bulletin de nouvelles* de la SCMO s'est poursuivie sous le même format établi les années précédentes. Un changement introduit sur le plan de la publication était de combiner les bulletins de juin et août.

Nous désirons remercier tous les membres pour leur contribution au *bulletin*.

Avard Mann
Rédacteur du *Bulletin*

REPORT OF THE SCIENTIFIC COMMITTEE

The Scientific Committee membership in 1981-82 included:

Dr G.J. Boer (Chairman), Atmospheric Environment Service, Toronto
Dr K.D. Hage, University of Alberta, Edmonton
Dr J.B. Gregory, University of Saskatchewan, Saskatoon
Dr Y. Delage, Atmospheric Environment Service, Dorval
Mr J.-G. Cantin, Université du Québec à Montréal, Montréal
Dr S. Pond, University of British Columbia, Vancouver
Dr P.C. Smith, Bedford Institute of Oceanography, Dartmouth
Dr H.-R. Cho, University of Toronto, Toronto
Prof. E.P. Lozowski, University of Alberta, Edmonton
Prof. H.J. Thiébaux, Dalhousie University, Halifax
Prof. J. Derome, McGill University, Montréal
Dr G.W. Summers, Atmospheric Environment Service, Downsview

The Committee held two meetings during the year, one in Saskatoon in conjunction with the CMOS Congress, on May 26, and the other in Downsview on November 17.

After the creation of the Committee on Meteorological Education in May 1981, following the recommendation of SCICO, examination of the suitability of meteorological education to meet the requirements of professional employment is no longer a specific mandate of this Committee. However, a formal liaison has been established between the two committees to bridge their common interests.

The subjects that consumed most of the Committee's time were (1) meteorological and oceanographic satellite research, and (2) the Canadian Computer Facility.

A subcommittee presented proposals for Canadian-supported satellite research and the Scientific Committee endorsed recommendations for some methods of stimulating development of Canadian expertise in the field of remote sensing. More detailed input of oceanographic data archiving requirements was called for.

The question of future availability of a vector computer facility to the scientific community received considerable attention. The proposed use of a federal facility by the university community appears to be a short-term solution to scientific requirements. However, it was generally agreed that longer term plans for a major computing facility for academic research, under NSERC, are called for.

The proposal for a separate, meteorological and oceanographic committee of NSERC has not received much support from the universities; and SCICO has dropped this from further consideration, for the time being.

Other major subjects addressed by the Scientific Committee included:

- Proposal for a national cyclone project
- FGGE data availability
- Resolution of the acid rain problem
- The Canadian Climate Program

In addition, the Committee received a recommendation for an overlapping pattern of membership on the CNC/IUGG. A nominating subcommittee of SCICO was created, consisting of one oceanographer, one meteorologist, and the chairman of SCICO.

H. Jean Thiébaux
Secretary

RAPPORT DU COMITÉ SCIENTIFIQUE

Le Comité scientifique de 1981-1982 comprend:

M. G.J. Boer (Président), Service de l'environnement atmosphérique, Toronto
M. K.D. Hage, Université de l'Alberta, Edmonton
M. J.B. Gregory, Université de la Saskatchewan, Saskatoon
M. Y. Delage, Service de l'environnement atmosphérique, Dorval
M. J.-G. Cantin, Université du Québec à Montréal, Montréal
M. S. Pond, Université de la Colombie-Britannique, Vancouver
M. P.C. Smith, Bedford Institute of Oceanography, Dartmouth
M. H.-R. Cho, Université de Toronto, Toronto
Prof. E.P. Lozowski, Université de l'Alberta, Edmonton
Prof. H.J. Thiébaux, Université Dalhousie, Halifax
Prof. J. Derome, Université McGill, Montréal
M. G.W. Summers, Service de l'environnement atmosphérique, Downsview

Le Comité a tenu une réunion lors du congrès, le 26 mai 1981 à Saskatoon, et s'est réuni à nouveau le 17 novembre à Downsview.

Depuis la mise sur pied en mai 1981, du Comité de formation et de l'éducation en météorologie sur la recommandation du Comité scientifique, l'évaluation de la pertinence de l'éducation en météorologie pour satisfaire les exigences professionnelles de l'emploi n'est plus du ressort de ce dernier. Cependant les deux comités restent en liaison sur des sujets d'intérêt commun.

Deux thèmes ont principalement retenu l'attention du Comité, soit: la recherche dans le domaine des satellites météorologiques et océanographiques et la création d'un centre de calcul canadien.

Un sous-comité a soumis des propositions pour que le Canada subventionne la recherche dans le domaine des satellites et le Comité scientifique a endossé des recommandations visant à stimuler le développement de compétences au Canada en télédétection. On a aussi souhaité que les besoins en données océanographiques soient mieux identifiés.

La question de la disponibilité prochaine pour la communauté scientifique d'un ordinateur à capacité vectorielle a reçu beaucoup d'attention. L'utilisation d'un service fédéral par les universités apparaît comme une solution à court terme aux besoins scientifiques. Cependant à plus long terme, on s'entend généralement sur la nécessité d'un centre de calcul voué à la recherche universitaire et placé sous la direction du CRSNG.

La création d'un comité distinct en météorologie et océanographie au sein du CRSNG n'a pas reçu beaucoup d'appui de la part des universités; par conséquent, le Comité scientifique a décidé de laisser temporairement cette question en suspens.

Les autres sujets d'importance sur lesquels le Comité s'est penché comprennent entre autres:

- l'étude d'un projet national sur les cyclones;
- la disponibilité des données FGGE;
- le problème des pluies acides;
- le programme climatique canadien.

Le Comité a aussi reçu une recommandation visant un changement de structure pour les membres du CNC/UGGI. Un sous-comité pour la nomination des membres du Comité scientifique a été formé; il comprend un océanographe, un météorologiste et le président du Comité scientifique.

H. Jean Thiébaux
Secrétaire

REPORT OF THE STANDING COMMITTEE ON PUBLIC INFORMATION

This year the Committee completed the re-write of a brochure on careers in meteorology that was published by the University of Toronto Guidance Centre as an occupational information brochure entitled "Meteorologist". For this effort CMOS received 500 copies gratis and, as a consequence we were able to answer numerous requests for information on careers in meteorology by sending out these brochures.

An occupational bulletin, again on careers as a meteorologist entitled "Entry Requirements" was reviewed and revised by the committee with support from Hans Van Leeuwen of the Atmospheric Environment Service, Downsview. The bulletin is published by the Department of Employment and Immigration and is intended for the Canadian Immigration Services in foreign countries as well as for foreign workers who are interested in establishing their permanent residence in Canada.

CMOS requires its own brochures in three specific areas (1) a career brochure on meteorologists (2) one on oceanographers and (3) a brochure describing the Society. The final draft of a document on a career in meteorology will be turned over to the incoming chairman.

The Standing Committee on Public Information has an important role to play in CMOS in the areas of "advertising" the Society and its purpose more aggressively, in encouraging meteorological and oceanographic projects at science fairs and in school programmes and in providing topical meteorological and oceanographic information to colleagues in other disciplines and to the public at large. Best of success to the next term of officers of the SCPI.

J.T. Kotylak
Chairman

RAPPORT DU COMITÉ PERMANENT D'INFORMATION PUBLIQUE

Cette année, le Comité a terminé la révision d'une brochure informative sur les carrières en météorologie, publiée par le Centre d'orientation de l'Université de Toronto. La SCMO a reçu à titre gracieux 500 exemplaires de la brochure, ce qui nous a permis d'en distribuer un grand nombre aux personnes désirant ces informations.

Le Comité a aussi révisé, avec l'aide de Hans Van Leeuwen du Service de l'environnement atmosphérique à Downsview, un autre bulletin sur les progressions en météorologie, publié cette fois par le ministère de l'Emploi et de l'Immigration à l'intention des services canadiens d'immigration à l'étranger et des travailleurs étrangers intéressés à venir s'établir au Canada.

Il serait bon que la SCMO dispose de brochures sur la profession de météorologiste, sur la profession d'océanographe et sur la Société elle-même. On a déjà commencé à préparer un document sur la carrière de météorologiste, qui sera soumis au nouveau président.

Le Comité permanent d'information publique joue un rôle important au sein de la Société en faisant connaître celle-ci et son mandat, en encourageant les travaux météorologiques et océanographiques présentés dans le cadre d'expositions scientifiques ou de programmes scolaires et en fournissant des informations météorologiques et océanographiques à nos collègues d'autres disciplines ainsi qu'au grand public. Pour l'année qui vient, tous mes vœux de succès aux membres du Comité.

J.T. Kotylak
Président

REPORT OF THE MEMBERSHIP COMMITTEE

Members

P.J. Kociuba – (Interim Chairman), Corresponding Secretary

E.E. Wheaton – Saskatchewan Centre

J.C. McLeod – Alberta Centre

The membership committee met once in 1981 at the Annual Congress in Saskatoon.

The Membership Committee's major role was the recommendation of an "Associate" Membership category to the AGM. This was approved for a two-year trial period, during which time present CMOS members would not be able to transfer to the Associate Member category. The Associate Member does not receive *ATMOSPHERE-OCEAN* and is under restrictions regarding rights and privileges at the national level. Members of Special Interest Groups should be encouraged to have associate membership in the Society. In 1981, the Society had one Associate Member.

Membership renewals were produced by the Society for the 1982 year rather than by the University of Toronto Press. Various minor problems have been encountered; these will be sorted out and will help in the transition to our permanent office in 1982.

It is the feeling of the chairman that questions of membership status cannot be adequately handled by the Corresponding Secretary during the transition period in 1982. It has therefore been recommended that a Membership Secretary be appointed for the coming year.

P.J. Kociuba
Interim Chairman

RAPPORT DU COMITÉ D'ÉLIGIBILITÉ DES MEMBRES

Membres

P.J. Kociuba – (Président suppléant), Secrétaire-correspondant

E.E. Wheaton – Centre de la Saskatchewan

J.C. McLeod – Centre de l'Alberta

Le Comité d'éligibilité des membres s'est réuni une fois en 1981, à l'occasion du congrès annuel tenu à Saskatoon.

La principale initiative du Comité a été de recommander, lors de l'Assemblée générale annuelle, l'établissement d'une nouvelle catégorie de membres "associés". Cette recommandation a été approuvée pour une période d'essai de deux ans, pendant laquelle les membres actuels de la Société ne pourront pas s'inscrire à titre de membres associés. Les membres associés ne recevront pas la publication *ATMOSPHERE-OCEAN*, et ne jouiront pas de tous les droits et privilèges habituellement accordés à l'échelon national. Il faudrait inciter les membres des groupes d'étude de sujets particuliers à devenir membres associés de la Société. En 1981, la Société comptait un seul membre associé.

C'est la Société elle-même, et non les Presses de l'Université de Toronto, qui a envoyé aux membres leurs avis de renouvellement de cotisation pour 1982. L'expérience ainsi acquise facilitera la tâche au nouveau bureau permanent en 1982.

Le président est d'avis que pendant la période de transition, en 1982, le secrétaire-correspondant ne pourra pas adéquatement traiter les questions reliées au statut des membres. On a donc recommandé la nomination d'un secrétaire, pour l'année à venir.

P.J. Kociuba
Président suppléant

REPORT OF THE COMMITTEE ON PROFESSIONALISM

The CMOS Committee on Professionalism is made up of:

Robert Charlton (Chairman), University of Alberta

Randy Angle, CMOS Council

Robert Humphries, Alberta Research Council

Douglas Leahey, Western Research and Development Ltd

Dennett Netterville, Syncrude Canada Ltd

N.J. Campbell (Corresponding Member), Department of Fisheries and Oceans, Ottawa

H.-R. Cho (Corresponding Member), University of Toronto

During its second year, the Committee on Professionalism continued to try to implement the findings of the Ad Hoc Committee on Meteorological Standards in Canada, which published its final report in May 1978, and the findings of the Review and Evaluation Committee which elaborated on the aforementioned findings in a May 1979 report entitled, "Consulting and Professionalism".

The Committee on Professionalism held three meetings during 1981 and reported regularly at Council and Executive Meetings. At the Fifteenth Annual General Meeting, By-Law 6(j), establishing the Committee on Professionalism, was accepted by the members and By-Law 16 establishing a Code of Ethics was soundly defeated primarily because the proposed code was deemed to be too stringent. Since that time, the memberships of all Centres have been requested to consolidate their opinions on a Code of Ethics and send them to the Committee on Professionalism.

About 300 copies of the *Directory of Consultants* have been distributed, many on request following advertisement of its availability. Plans are underway to update the Directory in 1982. A study of private weather forecasters in Canada is being considered, as is the possibility that the Committee on Professionalism could be composed of members primarily from the Ottawa-Toronto area in the near future.

R. B. Charlton
Chairman

RAPPORT DU COMITÉ SUR LE PROFESSIONNALISME

Le Comité sur le professionnalisme de la SCMO est formé des personnes suivantes:

Robert Charlton (président), Université de l'Alberta

Randy Angle, Conseil de la SCMO

Robert Humphries, Albert Research Council

Douglas Leahey, Western Research and Development Ltd

Dennett Netterville, Syncrude Canada Ltd

N.J. Campbell (membre correspondant), Ministère des Pêches et des Océans, Ottawa

H.-R. Cho (Membre correspondant), Université de Toronto.

Durant sa deuxième année, le Comité sur le professionnalisme a continué à appliquer les recommandations que formulait en mai 1978, dans son rapport final, le Comité spécial des normes météorologiques au Canada. On s'est aussi efforcé de mettre en oeuvre les conclusions du Comité d'examen et d'évaluation, qui se penchait sur ces mêmes recommandations dans un rapport (mai 1979) sur la consultation et le professionnalisme.

Le Comité sur le professionnalisme s'est réuni trois fois en 1981 et a régulièrement présenté des rapports aux rencontres tenues par le Conseil et le Bureau d'administration. Les participants à la 15^e Assemblée générale annuelle ont adopté le règlement 6(j) créant le Comité sur le professionnalisme, tandis que le projet de règlement 16, établissant un code d'éthique, était rejeté par une forte majorité, principalement à cause de la rigueur excessive du code proposé. Depuis, on a demandé aux membres de tous les centres locaux de rassembler leurs opinions sur l'éventuel code d'éthique et d'en faire part au Comité sur le professionnalisme.

Nous avons distribué environ 300 exemplaires du répertoire des experts-conseils; un grand nombre d'exemplaires ont été demandés après la parution d'annonces à cet effet. On prépare actuellement le mise à

jour du répertoire pour 1982. On envisage de répertorier les spécialistes en prévisions météorologiques du secteur privé au Canada; par ailleurs, on se penchera sur la pertinence de regrouper au sein du Comité sur le professionnalisme une majorité de membres provenant d'Ottawa et de Toronto.

R.B. Charlton
Président

REPORT OF THE AWARDS COMMITTEE

The Committee actively canvassed members for nominations for the Society's five prizes and for Citations. Guidelines were developed for the preparation of nominations so as to ensure some uniformity in the supporting documentation. Although spanning the country from coast to coast the committee was able to discuss the nominations by conference telephone call and arrive at majority opinions without difficulty. A list of book prizes has been prepared.

D. Farmer, J. Mathieson, D. Leahey, J. Derome, D. Huntley, D. O'Neill

REPORT DU COMITÉ DES RÉCOMPENSES

Le Comité a activement sollicité les membres afin d'obtenir des candidatures pour les cinq prix et pour les citations décernés par la Société. En outre, on a élaboré des lignes directrices sur la préparation des candidatures, de façon à assurer une certaine uniformité dans la documentation présentée. Même si les membres du Comité sont disséminés un peu partout au pays, ils ont pu discuter des candidatures par conférence téléphonique et en venir sans difficulté à un consensus. On a aussi dressé une liste de volumes pouvant servir de prix.

D. Farmer, J. Mathieson, D. Leahey, J. Derome, D. Huntley, D. O'Neill

REPORT OF THE EDUCATION COMMITTEE FOR METEOROLOGY

It has been evident for some years that the CMOS can and should play a lead role in coordinating national aspects of meteorological education in Canada. The Scientific Committee has undertaken discussions on the topic and the Annual Congress has been the forum for formal and informal meetings between interested parties. In response to a request from such a meeting at the Saskatoon Congress, Council established the Education Committee for Meteorology.

The Committee met for the first time at McGill University in Montréal, on November 16, 1981. The membership consists of representatives from six universities (H.-R. Cho, C. East, E. Lozowski, T. Oke, D. O'Neill and T. Warn), the AES (P. Aber) and private industry (D. Davison) and further provides for official observers (L. O'Quinn, CCO) and a permanent (recording) Secretary (H. Van Leeuwen, AES). The Committee considered and adopted a set of Terms of Reference. These include the general purpose of the group, which is to consider all matters related to the education of meteorologists at Canadian universities and their opportunities for employment at home and abroad. To aid in this it was agreed to conduct a national survey by questionnaire. This will establish the present state and anticipated developments in education and employment.

T.R. Oke
Chairman

RAPPORT DU COMITÉ DE L'ÉDUCATION EN MÉTÉOROLOGIE

Depuis quelques années, il devient évident que la SCMO peut et doit assumer un rôle de leader pour coordonner les aspects nationaux de l'enseignement de la météorologie au Canada. Le Comité scientifique a entrepris certaines discussions à cet effet, tandis que le Congrès annuel a été le théâtre de rencontres officielles et officieuses entre les parties intéressées. En réponse à une demande présentée lors du Congrès de Saskatoon, le Conseil a créé le Comité de l'éducation en météorologie.

Le Comité, qui s'est réuni pour la première fois le 16 novembre 1981 à l'Université McGill (Montréal), regroupe des représentants de six universités (H.-R. Cho, C. East, E. Lozowski, T. Oke, D. O'Neill et T. Wam), du SEA (P. Aber) et de l'industrie privée (D. Davidson); on prévoit aussi des observateurs officiels (L. O'Quinn, du CCO) et un secrétaire (de séance) permanent (H. Van Leeuwen, SEA). Le Comité a élaboré et adopté un mandat, selon lequel le Comité est chargé de toutes les questions reliées à la formation des météorologistes dans les universités canadiennes et à leurs possibilités d'emploi au pays et à l'étranger. Un questionnaire sera d'ailleurs distribué à l'échelle nationale, pour faire le point sur la situation actuelle et future concernant la formation et l'emploi en météorologie.

T.R. Oke
Président

REPORT OF THE ARCHIVIST

During the year the editor of the CMOS *Newsletter* deposited in the archives a complete set of *Newsletters* from 1971 through 1981. Additional material has been added to the archives from former secretaries and other officers. At the annual awards banquet, during the 1981 Congress at Saskatoon, the Archivist spoke on the origins and early days of the Society. Later, in December, a similar talk was given to the Toronto Branch of the Society. Prospects look good for increased attention to the archives in 1983.

M.K. Thomas

RAPPORT DE L'ARCHIVISTE

Au cours de l'année, le rédacteur-en-chef a remis aux archives une série complète (1971 à 1981) du *Bulletin de nouvelles* de la SCMO; des documents supplémentaires y ont été ajoutés par d'ex-secrétaires et autres officiels. Lors du banquet annuel de remise des prix et citations au congrès de 1981 à Saskatoon, l'archiviste évoqua les débuts de la Société. Plus tard, en décembre, le même discours fut tenu à Toronto. Pour ce qui est de soulever un plus grand intérêt pour les archives, l'avenir s'annonce bien en 1983.

M.K. Thomas

REPORTS FROM LOCAL CENTRES AND CHAPTERS

VANCOUVER ISLAND CENTRE

Executive 1981-82

Chairman	Tad Murty	Institute of Ocean Sciences
Secretary	David Krauel	Royal Roads Military College
Treasurer	Gordon McBean	Atmospheric Environment Service
Coordinators	Humphrey Melling	Institute of Ocean Sciences
	Russ Davis	B.C. Ministry of Environment

Meetings

18 Feb.	Dr D. Steyn UBC	"The Depth of the Mixed Layer Over Vancouver Under Conditions of Advection and Subsidence"
11 Mar.	Gordon McBean AES	"STREX: Storm Transfer and Response Experiment"
25 Mar.	CMOS Annual Tour Speaker	"Remote Sensing, Oceans"
8 Apr.	Dr M.B. Danard	"Mesoscale Wind Modelling"
19 Nov.	Dr R. Charlson University of Washington Seattle	"Natural Factors Influencing the Chemistry of Precipitation"

The Centre will provide \$50 towards a book prize to be awarded annually in the Vancouver Island Regional Science Fair for the best exhibit relating to oceanography or meteorology.

Financial Statement 1981

Bank balance as of 1 January 1981 \$ 772.05

Income

Annual subvention	\$237.50	
Interest	21.22	
	<u>\$258.72</u>	<u>\$ 258.72</u>
		<u>\$1,030.77</u>

Expenses

Stationery	\$ 8.74	
Meetings	314.34	
Science Fair	45.00	
Bank charges	15.75	
	<u>\$383.83</u>	<u>\$ 383.83</u>

Bank balance as of 31 December 1981 \$ 646.94

B.C. MAINLAND CENTRE

As was decided by membership vote in September 1981, this centre has shifted its executive changeover to May in order to coincide with CMOS activities and reporting dates. The executive from September 1981 to May 1982 is:

Chairman	Douw Steyn	Department of Geography, UBC
Vice-Chairman	Dave Phillips	AES, Vancouver
Secretary/Treasurer	Brian Hammond	AES, Vancouver
Programme Director	Jim Stronach	Beak Consultants
Assistant Programme Director	Don Faulkner	AES, Vancouver

Meetings

22 Jan.	Dr S.E. Calvert Oceanography, UBC	"Manganese Nodules – an Overview"
25 Feb.	Dr G.A. McBean Institute of Ocean Sciences Patricia Bay	"The Storm Transfer and Response Experiment"
18 Mar.	Dr W.J. Emery Oceanography, UBC (AES/CMOS Tour Speaker)	"Satellite Remote Sensing, its Application to Oceanography and Meteorology"
7 Oct.	Don Faulkner Pacific Weather Centre Harvey Raynor Pacific Weather Centre	"Winter-time Low Level Jet in Yukon Valley"
13 Oct.	Dr J.S. Lague Environmental Research and Technology, Inc. A. Brotherstone B.C. Hydro and Power Authority	"Observations of a Low Level Jet Near Prince George"
25 Nov.	Dr T.J. Lyons Murdoch University Perth, Australia	"Stagnation and Nocturnal Temperature Jumps in a Desert Region of low Relief"

The executive have planned a full series of meetings for early 1982 and will host Dr J. Thompson (IOS), Dr W.G. Wellington (UBC), P. Schaerer (NRC) as well as being visited by Dr D. Whelpdale (AES) and Dr P.A. Taylor (AES/CMOS Tour Speaker).

The executive have noted a roughly constant membership in the centre with some losses of older members being offset by a fair number of new ones. Many of the newer members are graduate students in the various departments at UBC.

Financial Statement 1981

Balance as of 1 January 1981		\$ 456.54
<i>Income</i>		
Interest	\$ 27.55	
Subvention	520.00	
	<hr/>	
	\$547.55	\$ 547.55
		<hr/>
		\$1,004.09

Expenditures

Travel/Honoraria (speakers)	\$100.00	
Rentals/Refreshments (meetings)	161.43	
Correspondence supplies, printing	79.00	
	<u>\$340.43</u>	\$ 340.43
Credit balance as of 31 December 1981		<u>\$ 663.66</u>
		B. Hammond Secretary/Treasurer

ALBERTA CENTRE*Executive*

Chairman	D.S. Sortland
Vice-Chairman	C.M. Sackiw
Secretary-Treasurer	T.G. Medicott
Past Chairman	J.C. McLeod
Public Information Officer	Dr R.G. Humphries
Calgary Representative	Prof. R.D. Rowe

Meetings

21 Jan.	Dr John Maybank (National President)	"Activities of the CMOS"
24 Mar.	Dr John Ramsden	"The Computer as a Data Analysis Tool"
7 Apr.	William J. Emery	"Satellite Remote Sensing, its Application to Oceanography and Meteorology"
8 Apr. (Calgary)	(Tour Speaker)	
15 Apr.	Dr G. McBean	"STREX - Storm Transfer and Response Experiment"
22 Sept.	Dr Maurice Danard	"Mesoscale Wind Modelling"
27 Oct.	Dr Russell Schnell	"A Biological Connection Between Rain, Hail and Freezing Crops"
7 Dec.		Annual Business Meeting and Slide Night

Financial Statement 1981

Balance as of 1 January 1981	\$659.36
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Income

Bank interest	\$ 58.76	
Disposal of surplus supplies	10.00	
	<u>\$ 68.76</u>	\$ 68.76
		<u>\$728.12</u>

Expenses

Science Fair	140.00	
Postage	119.00	
Speakers	50.00	
1983 Congress arrangements	84.45	
Meetings	136.86	
Telephone calls	15.01	
Stationery	17.75	
Bank charges	14.00	
	<u>\$577.07</u>	<u>\$577.07</u>

Balance as of 31 December 1981

\$151.05

SASKATCHEWAN CENTRE

*Executive**1981**1982*

Chairman	Earle Ripley	Stan Shewchuk
Vice-Chairman	Stan Shewchuk	John Bergsteinsson
Past Chairman	Jeff Whiting	Earle Ripley
Secretary-Treasurer	Don Bauer	Don Bauer
Membership	Elaine Wheaton	Elaine Wheaton
Public Information	John Dublin	Ron Hopkinson

The Centre's main activity during the year was the hosting of the Fifteenth Annual CMOS Congress. Largely because of that, other activities were minimal – comprising the AES/CMOS Tour Speaker in April, a return visit by the 1979 Tour Speaker, Alister Fraser, and the Annual General Meeting.

Meetings

6 Apr.	William J. Emery, Dept. of Oceanography, UBC	"Satellite Remote Sensing – Its Application to Oceanography and Meteorology"
	CMOS/AES Tour Speaker	
Oct. 22	Alister Fraser, Meteorology Dep., Penn. State University	"The Physics of Rainbows"
Dec. 8	General Business Meeting	Election of Officers

Financial Statement – 1981

Balance as of 31 December 1980		\$ 290.07
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Receipts

Subvention	\$135.00	
Bank interest	43.50	
Net proceeds from CMOS Congress	<u>326.87</u>	
	\$795.44	\$ 795.44
		<u>\$1,085.51</u>

Expenses

Invited speaker – travel	\$200.31	
Bank charges	<u>15.45</u>	
	\$215.76	\$ 215.76

Credit Balance as of 31 December 1981		\$ 579.68
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E. A. Ripley
Chairman

WINNIPEG CENTRE*Activities – 1981*

A dinner meeting was held on February 6 with CMOS Tour Speaker Dr William Emery. His topic was "Remote Sensing". Awards were presented to the top three entrants in the Manitoba Schools' Science Symposium. The judges were Mr H.M. Hacksley and Mr R. Howell. A dinner meeting was held on October 1 with Mr Clive Jarvis of AES, Downsview, speaking on "Marine Environmental Forecasting Systems".

Financial Statement 1981

Balance as of 1 January 1981 (includes \$5.00 share in Credit Union)	\$ 655.43
Petty Cash	3.18

Income

February 6 dinner meeting	\$224.00	
Interest, 30 June 1981	32.54	
October 1 dinner meeting	144.00	
Interest, 31 December 1981	<u>33.10</u>	
	\$433.64	\$ 433.64
		<u>\$1,092.25</u>

Expenses

February 6 dinner meeting	293.44	
Service charges, February	2.36	
MSSS awards, May 1981	116.00	
Service charges, May	3.54	
October 1 dinner meeting	177.60	
Service charges, October	1.18	
	<u>\$594.12</u>	<u>\$ 594.12</u>
Balance as of 31 December 1981		<u><u>\$ 498.13</u></u>

G.D. Machnee
Chairman

TORONTO CENTRE

Executive 1981

Chairman	Han-Ru Cho
Secretary	Glen Lesins
Treasurer	Douglas Chan
Programme Coordinators	Kaz Higuchi and Mary Ann Jenkins

Meetings

6 Jan.	F. Durrant	"Water Supply and Demand in Egypt"
4 Feb.	W.E. Emery UBC CMOS/AES Tour Speaker	"Satellite Remote Sensing and its Application to Oceanography and Meteorology"
16 Feb.	G. McKay AES	"Climate and Energy"
12 Mar.	A.C. Wiin-Nielsen WMO	"Prediction and Predictability of Weather and Climate"
6 Apr.	M. Newark AES	"Tornadoes"
30 Sept.	Annual Election R. Stewart AES	"Influence of Melting on Stratiform Clouds"
1 Dec.	M.K. Thomas AES	"The Origins and Early Days of the Canadian Meteorological Society"

Seven meetings were held during the year. They were generally well attended.

In March, our members were treated by the visit of Prof. Wiin-Nielsen, the Secretary-General of WMO, who gave the Andrew Thomson Memorial Lecture. It was heartening to see a CMOS meeting packed with people. Besides the slate of interesting speakers the Centre participated in a number of ventures. H.-R. Cho, Centre Chairman, represented CMOS at the Canada Wide Youth Science Fair held in May at the University of Waterloo. CMOS is a cosponsor of the event and a prize was awarded to the best exhibit in the atmospheric sciences. In September, a successful wine and cheese social was held after the very successful annual election meeting. Finally in November, Doug Chan visited a high school to give a talk on meteorology and careers.

A number of meetings have been planned for the coming year. Prof. R. List of the University of Toronto will be the speaker at the first meeting of the year on January 25, 1982. The title of his talk will be "Chinese Impressions - Scientific and Otherwise". If enough interest exists a special dinner meeting will also be held. In addition, at the request of the Committee on Professionalism, the Centre Executive will be soliciting opinions from the members on the need for professional status and a code of ethics.

H.-R. Cho
Chairman

Financial Statement 1981

Balance as of 31 December 1980		\$ 458.23
<i>Income</i>		
Subvention	\$513.00	
Reimbursement for loan to AGU	162.22	
Interest	7.45	
	<u>\$682.67</u>	<u>\$ 682.67</u>
		<u>\$1,140.90</u>
<i>Expenditures</i>		
Stamps	\$118.40	
Guest speakers	117.85	
Wine and cheese	169.82	
	<u>\$406.07</u>	<u>\$ 406.07</u>
Balance as of 31 December 1981		<u><u>\$ 734.83</u></u>
		D. Chan Treasurer

OTTAWA CENTRE

Executive Members 1981/82

Chairman	G.M. Shimizu
Vice-Chairman	G.K. Sato
Secretary-Treasurer	J.C. Falkingham
Membership Officer	H.A.C. Jones
Past Chairman	L.D. O'Quinn

Meetings

14 Jan.	R.J. Fichaud	"Report on WMO Mission to Zaire"
11 Feb.	Dr G. Austin	"Use of Radar and Satellite Data for Short-Term Precipitation Forecasting"
18 Mar. (dinner meeting)	Murray Forbes	"Past, Present, and Future of the Ottawa Weather Office"

13 May	Jack Vallentyne	"The World Decade of the Biosphere, 1982-1992"
30 Sept.	Dr W.A.B. Douglas	"Labrador Weather and the Battle of the North Atlantic - An Episode from 1943"
27 Oct.	Dr Olaf Loken	"Current Developments in the Beaufort Sea"
2 Dec.	Dr R.O. Ramseier	AES/RadarSat Experiment at Mould Bay"

Financial Statement 1981

Bank balance as of 1 January 1981	\$672.11	
Petty cash on hand, 1 January 1981	21.68	
Total cash on hand	\$693.79	\$ 693.79
<i>Income</i>		
Interest	\$ 79.52	
CMOS subvention	282.50	
	\$362.02	\$ 362.02
		<u>\$1,055.81</u>
<i>Expenses</i>		
Speaker meetings	\$ 35.50	
Trophies for Youth Science Fairs	25.25	
Cash prize for YSF	75.00	
Postage and stationery supplies	135.31	
Bank service charges	0.40	
	\$271.46	\$ 271.46
Balance		<u><u>\$ 784.35</u></u>
Bank balance (two accounts) as of 31 December 1981	\$783.49	
Petty cash on hand, 31 December 1981	0.86	
	<u>\$784.35</u>	

J.C. Falkingham
Secretary-Treasurer

CENTRE DE MONTRÉAL

Activités en 1981

25 mars	Université McGill	Visite des installations du radar de McGill
15 avril	Charles Van Wagner Forest Fire Research Institute Petawawa	"Meteorology of Forest Fires"
26 mai	Serge Occhietti Université du Québec à Montréal	"Climatologie historique de la vallée du St-Laurent"

9 nov.	Boris Koloskov Aerological Observatory of Moscow	"Discussion on Doppler Radar"
16 déc.	Luc Pouliot Centre de Prévisions du Québec	"Le barrage vert en Algérie"

États des revenus et des dépenses 1981

Exercice clos le 31 décembre 1981

Revenus

Intérêts bancaires	\$ 1.68	
Vente de rafraîchissements	57.60	
Vente de billets (pause café)	120.00	
Subvention	340.00	
	<hr/>	
	\$519.28	\$519.28

Dépenses

Frais de gestion	\$ 10.20	
Refractissements (sauf la pause café)	174.64	
Frais de représentation (conférenciers)	42.00	
Frais de bureau (timbres)	34.00	
Frais de pause café	226.31	
	<hr/>	
	\$487.15	\$487.15

Excédent des revenus sur les dépenses		\$ 32.13
		<hr/>

Bilan au 31 décembre 1981

Actif à court terme

En caisse	\$ 45.25	
En chèques (Subventions 1980-81, 81-82)	700.00	
	<hr/>	
	\$745.25	\$745.25

Passif à court terme

\$241.35

Avoir du fonds

Solde au 1 ^{er} janvier 1981	\$471.77	
Excédent des revenus sur les dépenses	32.13	
	<hr/>	
Solde au 31 décembre 1981	\$503.90	\$503.90
		<hr/>
		\$503.90

Margaret E. Leed
Trésorier

CENTRE DE QUÉBEC

Membres du Conseil d'administration

Président	Richard Leduc
Vice-Président	Claude Lelièvre
Secrétaire	Fernando Sheriff
Trésorier	Guy Lemelin
Conseillers	R. Bouffard
	J.P. Boucher
	Y. Boutin
	M. Lachance
	P.E. Parent

Résumé des principales activités – 1981

L'année 1981 s'inscrit dans la poursuite de la diversification des activités de la Société. Au total, 6 conférences furent présentées touchant les sujets les plus divers; on tente cependant de mettre l'accent sur le côté environnemental. À ce centre, la Société a organisé encore cette année une conférence publique dans le cadre du Mois de l'environnement – 1981.

Notre station mobile a été utilisée à plusieurs reprises et tout notre équipement fut installé durant juillet au centre écologique de Port-au-Saumon. Durant l'année, deux présentations à des groupes privés furent faites au nom de la Société.

En ce qui concerne nos activités de recherche sur le climat urbain de Québec, les résultats de l'expérience de février 1980 ont été publiés en 1981. On a aussi complété l'extraction de toutes les données du réseau automatique installé du juin à novembre 1980 sur le territoire de la CUQ. Cependant, faute de fonds, on n'a pu se permettre de consacrer des efforts supplémentaires à ce projet.

En 1981, la Société a décerné deux prix annuels dont les récipiendaires sont G. Soucy et G. Paulin.

On a préparé une demande de subvention pour le programme québécois d'éducation à l'environnement. Même si celle-ci nous fut refusé on entend la modifier et la resoumettre pour 1982.

La Société a aussi participé aux réunions préparatoires pour la tenue de la Semaine des Sciences.

Liste des conférenciers – 1981

9 fév.	André Hufty	"Propos sur les fluctuations climatiques récentes"
9 mars	David Leslie	"Les systèmes d'énergie solaire passif en architecture"
15 avril	G.L. Austin	"Utilisation des données simultanées du satellite GOES et du radar pour la prévision à court terme de la précipitation"
11 mai	Claude Lelièvre	"Les pluies acides: point de vue québécois"
		Conférence présentée dans le cadre du Mois de l'environnement, 1981
16 oct.	R. Barrett	"Les urgences environnementales et leur traitement"
23 nov.	Gaston Paulin	"Le Québec et les pluies acides"

Conférences projetées – hiver 1982

25 jan.	Claude Girard	"Les prévisions météorologiques à moyenne échéance"
mars	à déterminer	
avril	P.A. Taylor	
mai	à déterminer	

Etats financiers de l'année 1981

Actif en caisse le 1 ^{er} janvier 1981		\$ 349.57	
<i>Revenus</i>			
Cotisation des membres (76)	\$ 343.00		
Subvention de la SCMO	135.00		
Subvention d'Environnement-Québec (2)	1,100.00		
Intérêts	42.03		
	<u>\$1,620.03</u>		
Capital social	5.00		
	<u>\$1,625.03</u>	\$1,625.03	
		<u>\$1,974.60</u>	
<i>Dépenses</i>			
Conférenciers invités	\$ 191.23		
Secrétariat	332.37		
Assemblée générale annuelle	250.78		
Prix annuels (G. Paulin et G. Soucy)	88.56		
Réunion spéciale	70.86		
Station météorologique mobile	23.00		
Expérience "Ilot de chaleur"	70.00		
	<u>\$1,026.80</u>		
Immobilisation du capital social	5.00		
	<u>\$1,031.80</u>	\$1,031.80	
Solde en caisse le 31 décembre 1981		\$ 942.80	
		<u><u>\$ 942.80</u></u>	
		Guy Lemelin,	
		Trésorier	

CENTRE DE RIMOUSKI

Membres du Conseil d'administration

Président	Jean Lebel
Trésorier	Donald Tremblay
Secrétaire	Michel Khalil

Liste des conférenciers - 1981

11 sep.	Dr J.C. Amiard Lab. de Biologie marine du CNRS Nantes, France	"Etude <i>in situ</i> du transfert des métaux dans les chaînes alimentaires estuariennes"
14 oct.	Dr Jean Durr École des Mines de Douai, France	"Utilisation de méthodes physiques d'analyses rayons-X et décharges lumineuses"

19 nov.	MM. Gaston Desrosiers et J.-Claude Brethes Dép. d'Océanographie Univ. du Québec à Rimouski	"Étude de l'endofaune benthique de la région des estuaires St-Jean et Romaine – Basse Côte-Nord"
3 déc.	M. Bruno Scherrer Univ. du Québec à Montréal	"Techniques de sondages et écologie"

Conférences projetées – hiver 1982

21 jan.	Dr Michel Gagnon Université du Québec à Chicoutimi	"Ligne de base des hydrocarbures au niveau des grands bancs de Terre-Neuve"
28 jan.	Nelson Belzile Université du Québec à Rimouski	"Processus hydrogéochimiques dans l'estuaire de la rivière Rimouski"
4 fév.	Dr Hugues Menard Université de Sherbrooke	"Polarographie dans les mélanges acide fluorhydrique – eau"
11 fév.	Dr Jean-Louis Sebedio Nova Scotia Technical College	"Les méthodes chromatographiques appliquées à l'étude des lipides marins"
16 fév.	Dr Barbara Karakiewicz Institut des Sciences de la mer de Hambourg Allemagne	"Mécanique des fluides dans le golfe de la Baltique, courants et érosion"
25 fév.	Dr Pierre Marsot INRS-Océanologie Rimouski	"Perspectives d'application d'une méthode de culture à dialyse pour le phytoplancton à partir d'un milieu eutrophique naturel"
11 mars	Dr Michael Pilson University of Rhode Island	
18 mars	M. André Tessier INRS-Eau Québec	"L'importance de la spéciation des métaux traces"
25 mars	Dr B. Vincent Université du Québec à Trois-Rivières	"Variations spatio-temporelles de la structure de groupements benthiques dans le Saint-Laurent"
1 ^{er} avril	Dr Carlos Vale Université du Québec à Rimouski	"Relation entre la zone de turbidité maximum et l'amplitude de marée dans un estuaire de faible profondeur"

Transactions bancaires depuis le début

Date	Description	Crédit	Débit	Solde
30.11.79	Subvention de départ de la SCMO	\$130.00		
08.04.80	Réception à l'INRS		\$ 30.00	
01.05.81	Bourse aux jeunes scientifiques à Amqui		50.00	
11.05.81	Chèque de cotisation de la SCMO	110.00		
26.05.81	Refus d'encaisser le chèque de la SCMO		110.00	
30.09.81				50.00
27.11.81	Chèque de cotisation de la SCMO	200.00		
07.12.81	Paiement du compte de Louis-Phillippe Lapointe – Activité à l'INRS		125.00	
14.01.82				\$125.00

HALIFAX CENTRE

Executive

Chairman	Denis Lefavre	Bedford Institute of Oceanography
Secretary	Eldon J. Oja	Maritimes Weather Office
Treasurer	Francis C. Tan	Bedford Institute of Oceanography

Meetings

14 Jan.	Ms Jackie Booth Plansearch Inc.	"Eastern Arctic Environmental Impact Studies"
11 Feb.	Ms Zoe Lucas Director, Sable Island Restoration Project	"Reclaiming Sand Dunes"
25 Mar.	Dr Harvey Silverstein Dept. of Political Science Dalhousie University	"Secret Technologies and Untapped Data – How Antisubmarine Warfare Systems can be Used for Ocean Monitoring in Non-Military Ways"
7 Apr.	Dr G.I. Austin AES/CMOS Tour Speaker McGill University	"Combining Satellite and Radar Data for the Short-Range Forecasting of Precipitation"
6 May	Prof. Chris K. Watts Tech. Univ. of Nova Scotia	"Wave Power"
21 Oct.	Alan Ruffman President Geomarine Assoc. Ltd	"The Real World of a Commercial Geophysicist and the Interface with Physical Oceanography"
18 Nov.	Fred Morley Atlantic Provinces Economic Council	"The Economic Future of the Atlantic Region"

The members met alternately at the AES Maritimes Weather Office and at the Bedford Institute of Oceanography. Our audience increased substantially by doing so. The dinner meeting with Ms Zoe Lucas was a full success.

We continued our participation in regional science fairs, providing judges, money support and magazine prizes.

Our principal occupation was to keep track of the Weather Kits designed and assembled by some of our members a few years ago. This was done in order to start to update them, which we did. We will pursue this followup.

Financial Statement 1981

Bank balance as of 31 December 1980	\$509.74	
Petty cash on hand, 31 December 1980	1.58	
	<hr/>	
	\$511.32	\$ 511.32

Income

Annual subvention	\$277.50	
Bank interest	24.51	
Tickets: Dinner meeting, 11 February	231.00	
	<hr/>	
	\$533.01	\$ 533.01
		<hr/>
Total available funds		\$1,044.33

Expenses

Funds to New Brunswick Chapter	\$ 27.50	
Science Fair prizes: Cape Breton	50.00	
Halifax-Dartmouth	50.00	
Chinook (subscription, Science Fair prizes)	12.00	
Royal Canadian Geographical Society (subscription, Science Fair prizes)	28.00	
Dinner meeting expenses, 11 February	237.50	
Refund of dinner tickets	14.00	
Refreshments for Centre meetings	33.52	
Postage	21.59	
Bank service charge	1.00	
	<u>\$475.11</u>	<u>\$ 475.11</u>
Available funds over expenses		<u>\$ 569.22</u>
Bank balance, 31 December 1981 – Savings Account	\$416.25	
Checking Account	122.50	
Petty cash on hand, 31 December 1981	30.47	
	<u>569.22</u>	
Total balance as of 31 December 1981		<u>\$ 569.22</u>
		F.C. Tan Treasurer

NEW BRUNSWICK CHAPTER

The New Brunswick Chapter completed its second full year of operation. We held three regular meetings – one of which was a well-attended open meeting organized for the AES/CMOS Tour Speaker Dr Geoff Austin, another a joint meeting with the Graduate Seminar of the UNB Faculty of Forestry. All meetings were held at Fredericton. Professor R.B.B. Dickison, University of New Brunswick, continued to serve as correspondent; Paul Galbraith, AES Meteorologist, served as programme Chairman until his transfer in mid-year.

Meetings

26 Feb.	Wayne G. Lumsden Base Met. Officer CFB Gagetown	"Military Meteorological Requirements"
8 Apr.	Dr G.L. Austin McGill Radar Weather Observatory (AES/CMOS Tour Speaker)	"Combining Satellite and Radar Data for the Short-Range Forecasting of Precipitation"
21 Oct.	Kieth Barr N.B. Dept. of Natural Resources	"Forest Fire Weather – Experiences in Honduras vs New Brunswick"

Financial Statement 1981

Cash on hand as of 1 January 1981	\$12.20
<i>Income</i>	
Subvention from Halifax Centre	\$27.50
<i>Expenses</i>	
Meetings	\$ 2.20
Balance	\$37.50

ST JOHN'S CENTRE

Executive 1981-82

Chairman	Laurie Davidson	Seaconsult Limited
Secretary	Judith Bobbitt	Oceans Ltd
Treasurer	Chris Noll	Newfoundland Petroleum Dir.

Meetings

28 Jan.	Mike Hewson Nordco Ltd	"The Marine User of Environmental Services"
18 Feb.	Les Hulett Govt of Newfoundland and Labrador	"Acid Rain"
6 Apr.	Dr G. Austin AES/CMOS Tour Speaker McGill University	"Combined Satellite and Radar Data for Short-Range Forecasting of Precipitation"
21 May	Dr Gabriel Godin Marine Environmental Data Service Ottawa	"Irregular Tides in Hudson and James Bay" (joint CMOS, NICOS meeting)
6 Oct.	Dr Gordon McKay Climatological Applications Branch, AES	"Climatic Change"
5 Nov.	Dr Lawrence Gray Canadian Centre for Remote Sensing Ottawa	"Microwave Remote Sensing of the Cold Ocean" (joint CMOS, IEEE meeting)

The official status of the Newfoundland Chapter was changed to the Newfoundland and Labrador Centre by Council in October 1981. The membership totals over 30 with the majority residing in the St. John's region.

The Centre plans to sponsor a science project competition in 1982 similar to the one held in 1980, using the prize money donated by local companies.

Financial Statement 1981

Bank balance as of 31 December 1980		\$299.85
<i>Income</i>		
Annual subvention	\$195.00	
Interest	35.90	
	<u>\$230.90</u>	<u>\$230.90</u>
Total funds available		<u>\$530.75</u>
<i>Expenses</i>		
Advertising	\$ 41.29	
Meeting expenses	19.67	
Ledger	4.10	
	<u>\$ 65.06</u>	<u>\$ 65.06</u>
Actual funds over expenses		<u>\$465.69</u>
Actual balance on hand, 31 December 1981		465.69
Outstanding debts		
Technician		<u>50.00</u>
Balance as of 31 December 1981		<u><u>\$415.69</u></u>

REPORT OF THE SPECIAL INTEREST GROUP ON AIR POLLUTION METEOROLOGY

The Steering Committee consists of:

Dr J.D. Reid	(Chairman), AES, Downsview
R.P. Angle	(Secretary-Treasurer), Alberta Environment, Edmonton
Dr R.E. Munn	University of Toronto
Dr D. Steyn	University of British Columbia, Vancouver
Dr B. Weisman	MEP Company, Downsview

The group scientific sessions at the Saskatoon Congress were considered a promising start for the group activities by those who attended. Proceedings for the sessions were published during the year – thanks to the sponsorship of Alberta Environment.

In September the group issued its first newsletter, "APSIG UPDATE". A second issue appeared in February. As well as features on air pollution issues and projects, the newsletter contains information on recent publications, forthcoming meetings and information about members and the group. The newsletter is a first attempt to meet the challenge of serving a widely scattered membership. Another way this is achieved is by working within the larger CMOS structure for the interests of group members.

The Steering Committee met in Downsview in December to consider future activities. It was decided to organize specialized workshop format meetings. Topics suggested included "The Meteorological Content of Environmental Impact Assessments" and "Air Pollution Related Problems of Hazardous Substances". Discussions are now underway toward organizing these. The Steering Committee also considered the future regulation of Special Interest Groups within the Society, the general feeling being that the present structure was operating quite effectively.

The financial picture for the group is quite bright. As of January 30th the liquid assets were \$443.21, mainly from sales of the Congress Session Proceedings; the major expenditures were for the newsletter. It does not appear that it will be necessary to charge a group membership fee in the coming year.

John D. Reid
Chairman

RAPPORT DU GROUPE D'ÉTUDE DE SUJETS PARTICULIERS EN MÉTÉOROLOGIE DE LA POLLUTION DE L'AIR

Composition du Comité d'orientation:

M. J.D. Reid,	(Président), SEA, Downsview
M. R.P. Angle,	(Secrétaire-trésorier) ministère de l'Environnement de l'Alberta, Edmonton
M. R.E. Munn,	Université de Toronto
M. D. Steyn	Université de la Colombie-Britannique, Vancouver
M. B. Weisman	Cie MEP, Downsview

Ceux qui ont participé aux sessions scientifiques de groupe au Congrès de Saskatoon ont jugé qu'il s'agissait de débuts prometteurs. Grâce au parrainage du ministère de l'Environnement de l'Alberta, on a publié les actes des sessions au cours de l'année.

Le groupe a publié en septembre son premier bulletin d'information, "APSIG UPDATE". Un deuxième numéro a paru en février. Outre des articles sur des questions et des projets concernant la pollution atmosphérique, le bulletin d'information contient des renseignements sur des publications récentes, sur des réunions prévues et sur les membres et le groupe. Le bulletin s'efforce de relever un défi important en s'adressant à des membres très dispersés. Une autre façon d'y parvenir consiste à oeuvrer au sein de la structure, plus large, de la SCMO dans l'intérêt des membres du groupe.

Le comité d'orientation s'est réuni en décembre à Downsview afin d'envisager les futures activités. On a décidé d'organiser des réunions spéciales sous forme du groupe de travail. Les sujets proposés comprenaient notamment "Le contenu météorologique des études d'impacts environnementaux" et "Problèmes des

substances dangereuses et de la pollution de l'air". Des pourparlers sont actuellement en cours pour organiser ces activités. Le comité d'orientation s'est aussi intéressé à la réglementation future des groupes d'étude de sujets particuliers au sein de la Société; de l'avis général, la structure actuelle remplit assez efficacement son rôle.

La situation financière du groupe est assez bonne. En date du 30 janvier, l'actif disponible, qui se chiffrait à \$443.21, provenait principalement de la vente des actes des séances scientifiques au congrès; c'est le bulletin d'information qui a occasionné les principales dépenses. Il ne semble donc pas nécessaire d'imposer des droits d'adhésion au cours de l'année à venir.

John D. Reid
Président

REPORT OF THE HYDROLOGY SPECIAL INTEREST GROUP

The CMOS Special Interest Group in Hydrology was formed and approved by Council during the 15th Annual Congress in Saskatoon. The terms of reference of the group are:

- 1) To encourage the participation of hydrologists and hydrometeorologists in the activities of the Society;
- 2) To be an identifiable national interest group within CMOS that would be a focus for water interests, would sponsor special sessions at CMOS Congresses and encourage written submissions to the refereed journal of the Society, *ATMOSPHERE-OCEAN*;
- 3) To organize an ongoing CMOS programme of activities of interest to the hydrological community, such as joint meetings of CMOS with other scientific hydrological associations – the Hydrotechnical Conferences of the Canadian Society for Civil Engineers, the Canadian Water Resources Association and the Canadian Hydrology Symposia of the Associate Committee on Hydrology.

A steering committee selected in Saskatoon consists of G. Schaefer (Chairman), U. Sporns (Secretary), L. Wojtiw, A. Warkentin, N. Trivett and J.-P. Fortin.

The Special Interest Group in Hydrology has acted as a cosponsor of the 2nd Workshop on Data Collection Platforms held in conjunction with the 1982 Congress, and is pursuing a proposal for a joint Canadian Hydrology Symposium–CMOS Annual Congress, possibly in 1984.

D.G. Schaefer
Chairman

RAPPORT DU GROUPE D'ÉTUDE DE SUJETS PARTICULIERS EN HYDROLOGIE

À l'occasion du 15^e Congrès annuel, à Saskatoon, le Conseil a approuvé officiellement la formation d'un groupe d'étude de sujets particuliers en hydrologie, ayant pour mandat:

- 1) d'encourager la participation des hydrologistes et des hydrométéorologistes aux activités de la Société;
- 2) de constituer au sein de la SCMO un groupe national et reconnaissable pour servir de point de contact entre les personnes et organismes intéressés au domaine hydrologique, pour parrainer des séances spéciales pendant les congrès de la SCMO et pour encourager la soumission d'articles à la publication de la Société, *ATMOSPHERE-OCEAN*;
- 3) d'organiser pour la SCMO un programme continu d'activités présentant un intérêt pour la communauté hydrologique, comme par exemple l'organisation de rencontres mixtes entre la SCMO et d'autres associations scientifiques hydrologiques (conférences hydrotechniques de la Société canadienne du génie civil, réunions avec la *Canadian Water Resources Association* et symposiums du Comité associé de l'hydrologie).

Une comité directeur, choisi à Saskatoon, regroupe G. Schaefer (président), U. Sporns (secrétaire), L. Wojtiw, A. Warkentin, E. Trivett et J.-P. Fortin.

Le groupe d'étude de sujets particuliers en hydrologie a co-parrainé le deuxième groupe de travail sur les plates-formes de collecte de données, tenu pendant le congrès de cette année, et il poursuit ses travaux en vue d'un éventuel regroupement du symposium canadien en hydrologie et du Congrès annuel de la SCMO, peut-être en 1984.

D.G. Schaefer
Président

REPORT OF THE NOMINATING COMMITTEE RAPPORT DU COMITÉ DE MISE EN CANDIDATURE

The Nominating Committee (P.E. Merilees, Chairman; J. Maybank; N. Campbell; R. Ingram; B. Goodison; J. McTaggart-Cowan) is unanimous in nominating the following persons to the 1982 CMOS Executive. All nominees have expressed their willingness to serve in the indicated positions. The nominations have been made with the understanding that the CMOS Executive will shift to Ottawa in 1982.

C'est à l'unanimité que le Comité de mise en candidature (P.E. Merilees, président; J. Maybank; N. Campbell; R. Ingram; B. Goodison; J. McTaggart-Cowan) soumet la liste suivante de candidats au Bureau d'administration pour 1982. Tous les candidats ont consenti à occuper le poste indiqué. Les mises en candidature ont tenu compte du déménagement prévu du Bureau d'administration de la Société à Ottawa en 1982.

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Mr J.C. Falkingham
Ice Forecasting Central
Journal Tower South, 3rd Floor
365 Laurier Avenue West
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Mr J. Carr McLeod
Atmospheric Environment Service
6325 - 103 Street
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Department of Fisheries and Oceans
C.D. Howe Building, 7th Floor West
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6325 - 103 Street
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T6H 5H6

Dr G.T. Needler
Bedford Institute of Oceanography
P.O. Box 1006
DARTMOUTH, Nova Scotia
B2Y 4A2

P.E. Merilees
Chairman/Président

**LIST OF PREVIOUS RECIPIENTS OF SOCIETY AWARDS/
LAURÉATS DES ANNÉES PRÉCÉDENTES**

President's Prize/Prix du Président

1967 A. Robert	1974 G.A. McBean
1968 A.W. Brewer	1975 Not awarded
1969 G.T. Csanady	1976 W.F.J. Evans
1970 R.E. Munn	1977 P.E. Merilees
1971 M. Kwizak and A. Robert	1978 G. Garrett
1972 T.R. Oke	1979 Not awarded
1973 A.J. Chisholm and Marianne English	1980 P.H. LeBlond and L.A. Mysak

*Dr Andrew Thomson Prize in Applied Meteorology/
Prix du Dr Andrew Thomson en météorologie appliquée*

1967 A. Davenport	1973 H.P. Wilson	1977 J.I. MacPherson
1968 D. Davies	1974 R. Daley	1978 J.D. Reid
1969 M.K. Thomas	1975 G.A. McKay	1979 Y. Delage and C. Girard
1970 N. Yacowar	1976 S. Orvig and E.A. Vowinkel	1980 R.G. Humphries and B.L. Barge
1971 J.S. Marshall		
1972 P.W. Summers		

Graduate Student Prize/Prix aux étudiants diplômés

1967 S. Woronko	1972 L. Ettinger	1977 M. Beland
1968 Not awarded	1973 Y.S. Chung	L.W. Diehl
1969 T. Warn	1974 G. Strong	1978 B. McArthur
1970 N.A. McFarlane	1975 Helen Warn	1979 E. Friere and W.G. Large
1971 R.S. Schemenauer	1976 H. Melling	1980 J.W. Loder D.G. Steyn

*Dr Andrew Thomson Undergraduate Student Prize/
Prix du Dr Andrew Thomson aux étudiants du premier cycle*

1967 S. Clodman	1970 J.A. Fitzgerald	1973 M.A. Tilley
1968 I.R. Graham	1971 T. Low	1974 Not awarded
1969 T. Agnew	1972 Carole Dyck	

*Rube Hornstein Prize in Operational Meteorology/
Prix de météorologie opérationnelle Rube Hornstein*

1975 W.L. Guzman	1978 Bureau de prévision du Québec à Ville St-Laurent
1976 S.V.A. Gordon	1979 D.B. Fraser
1977 K. Lee	1980 Not awarded

Citations

1973 John A. Livingston Pierre Dansereau P.D. McTaggart-Cowan	
1974 Barbara Frum, Alan Maitland, Harry Brown and Staff, CBC "As It Happens" Alberta Environmental Conservation Authority Lydia Dotto (<i>Globe and Mail</i> Science reporter)	
1975 Tony Le Sauteur	
1976 Conseil Québécois de l'environnement Douglas H. Pimlott	
1977 Directors of the ARK, New Alchemy Institute, P.E.I.	
1978 Tim Padmore Canadian Arctic Resources Committee	
1979 Kenneth C. Curren La Société Linnéenne de Québec	
1980 Not awarded	

**LIST OF AES/CMOS LECTURE TOUR SPEAKERS/
CONFÉRENCIERS EN TOURNÉE, SOUS L'ÉGIDE DE LA SCMO ET DU SEA**

1969 K.M. King	1974 A.G. Davenport	1978 D.S. Davison
1970 T.R. Oke	1975 P.E. Merilees	1979 A. Fraser
1971 F.K. Hare	1976 J. Maybank	1980 M. Glantz
1972 M.B. Danard	1977 D.A. Huntley	1981 G.L. Austin W.J. Emery
1973 W.R. Frisken		

**LIST OF CORPORATE MEMBERS OF THE SOCIETY/
MEMBRES MORAUX DE LA SOCIÉTÉ**

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Airflow Development Canada Ltd	Hymeteq A.L. Ltd
Alberta Agriculture Advisory Committee on Weather Modification	INTERA Environmental Consultants Ltd
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	Wellsdale Research Ltd

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N. Sargent

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LES PRÉSIDENTS DE LA SOCIÉTÉ**

1961	R.H. Douglas	1971	C.M. Penner	1977	K.F. Harry
1962-64	B.W. Boville	1972	G.A. McKay	1978	R.W. Burling
1964-66	R.E. Munn	1973	W.F. Hitschfeld	1979	J.M. Powell
1966-69	A.W. Brewer	1974	A. Robert	1980	J. Maybank
1969-70	M.K. Thomas	1975	P.E. Merilees	1981	E.P. Lozowski
1970	D.N. McMullen	1976	J.E. Hay		

Continued from page 48

Poster 21

SUMMER 1979: ICE CLIMATOLOGY OF THE CANADIAN ARCTIC

B. Dey

The study reported here presents satellite-derived maps of ice cover and open water in the Canadian Arctic at the end of June through September, 1979. The areal expansion of open water in the 1979 summer season was much more than that of 1978. The large expansion of open water in southern Beaufort Sea and Baffin Bay was related to southeasterly winds, which caused advection of warm air masses from the south. On the contrary, the limited open water in the interior channels of the Canadian Arctic Archipelago was related to north and northwesterly winds resulting in advection of cold air masses from the north.

Poster 22

APPLICATIONS OF SEASAT SCATTEROMETER DATA FOR WEATHER FORECASTING

S. Peteherych, P.M. Woiceshyn, M.G. Wurtele, G. Cunningham, M. Borowski and A. Davies

The Seasat scatterometer can measure wind speed and direction over the ocean with a resolution of about 50 km with accuracies comparable to or better than conventional methods. Several case studies are presented that demonstrate how the data can be utilized for weather forecasting.

Poster 23

SEASAT SCATTEROMETER MEASUREMENTS OF ARCTIC ICE

S. Peteherych and D. Laurin

Seasat scatterometer data, Normalized Radar Backscatter Cross-section (NRCS) are available for the period July 7 to October 10, 1978 – summer melt to early freeze-up. The observations show a strong seasonal change in NRCS, as well as large spatial variations. The poster illustrates these features.

ENERGEX '82

ENERGEX '82, an international energy conference and exposition cosponsored by the Canadian Meteorological and Oceanographic Society, will be held 23-29 August 1982 in Regina, Saskatchewan. ENERGEX '82 will explore the technical, economic and human dimensions of energy self-reliance.

The exposition, to be held 25-29 August, will be one of the largest showplaces for energy and energy conservation developments ever held in Canada. Displays at Regina's Exhibition Grounds will focus on energy conservation and/or production and consumption in such areas as oil, gas, coal, and nuclear, solar and wind energy.

The eighth annual conference of the Solar Energy society of Canada Inc. will also be held 23-27 August at the University of Regina.

For information about ENERGEX '82, including the rental costs for displays, contact:

ENERGEX '82
Conference Chairman
University of Regina
Regina, Saskatchewan
S4S 0A2
Telex: 071-2683

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Signature of Applicant

Mail completed application forms to:

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Type J'aimerais devenir membre de la
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Manuscripts should be submitted to: *ATMOSPHERE-OCEAN*, Dept. of Meteorology, McGill University, 805 Sherbrooke St. West, Montreal, P.Q. H3A 2K6. Four copies should be submitted, typewritten with double spacing and wide margins. Headings and sub-headings should be clearly designated. A concise, relevant and substantial abstract in both English and French is normally required.

Tables should be prepared on separate sheets, each with concise headings.

Figures should be provided in the form of four copies of an original which should be retained by the author for later revision if required. A list of legends should be typed separately. Labelling should be made in generous size so that characters after reduction are easy to read. Line drawings should be drafted with India ink at least twice the final size on white paper or tracing cloth. Photographs (halftones) should be glossy prints at least twice the final size.

Units. The International System (SI) of metric units is preferred. Units should be abbreviated only if accompanied by numerals, e.g. "10 m" but "several metres".

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