

3rd ANNUAL CONGRESS



May 27 to 29, 1969

CANADIAN METEOROLOGICAL SOCIETY

3rd ANNUAL CONGRESS

MAY 27-29, 1969

PROGRAM

Tuesday - May 27

9.00 Opening Remarks M.K. Thomas, President, C.M.S.

1. THE ATMOSPHERE AS A RESOURCE

Session 1(a)

Chairman - J.R.H. Noble

1.1 9.15 The Role of Meteorology in
the National Economy P.D. McTaggart-Cowan,
Science Council of Canada

10.20 Coffee

1.2 10.40 The Role of Meteorology in
Agricultural Planning, Develop-
ment and Operations W. Baier,
Canada Department of
Agriculture, Ottawa

1.3 11.05 Weather Modification - A Survey
of Present Status with Respect
to Agriculture J. Maybank,
Saskatchewan Research Council,
et al*

1.4 11.30 Meteorology and Winter Sports G.O. Villeneuve,
Service de Météorologie,
Quebec.

Session 1(b)

Chairman - T.L. Richards

1.5 1.30 The Role of Meteorology in
Canadian Water Resources
Problems J.P. Bruce,
Canada Centre for Inland Waters,
Burlington

1.6 2.00 Meteorology and Electrical
Utilities D.K.A. Gillies,
Ontario Hydro,
Toronto

1.7 2.25 Weather and the Construction
Industry D.W. Boyd,
Meteorological Branch,
Ottawa

2.50 Coffee

Session 1(c)

Chairman - F.W. Benum

1.8 3.10 Weather Services for Land
Transportation K.T. McLeod,
Meteorological Branch,
Toronto

1.9 3.35 Resource Development in the
Canadian Arctic E.R. Weick, Head,
Transportation Section,
Northern Economic Development
Branch, Dept. of Indian Affairs
and Northern Development

4.25 Closing Remarks

Evening - Annual General Meeting
Wine and Cheese Party

Wednesday - May 28

2. TURBULENCE AND THE BOUNDARY LAYER

Session 2

Chairman - A.W. Brewer

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|-----|-------|---|--|
| 2.1 | 9.00 | Similarity of Turbulent Transfer of Heat and Momentum Across the Air-Sea Interface | M. Miyake, G. McBean,
University of British Columbia |
| 2.2 | 9.30 | Analysis of the Wind-Speed Profiles in the Surface Boundary Layer | O. Koren,
University of Alberta |
| 2.3 | 9.55 | On Air-Borne Measurements of the Vertical Fluxes of Momentum, Heat and Water Vapour | M. Miyake and M. Donelan,
University of British Columbia |
| | 10.20 | Coffee | |
| 2.4 | 10.40 | Correlations of Turbulence Elements Measured at Vertically Separated Points | O. Johnson and B. Larson,
Defence Research Establishment Suffield |
| 2.5 | 11.05 | The Limitations on the Use of an Airplane as a Wind Sensor | E.G. Morrissey,
Meteorological Branch, Toronto |
| 2.6 | 11.30 | Bomex Expedition | M. Miyake,
University of British Columbia |
| 2.7 | 11.55 | Generation and Development of Convective Cloud Produced by Explosion of 500 Tons of TNT at Suffield | J.A. McCallum,
Defence Research Establishment Suffield |

3. OBSERVATIONS AND FORECASTING

Session 3

Chairman - H.H. Bindon

- | | | | |
|-----|-------|--|--|
| 3.1 | 9.00 | Measurement of Infrared Emission from Water Vapour in the Stratosphere | A.W. Brewer and K.P.B. Thomson,
University of Toronto |
| 3.2 | 9.30 | Hydrological Applications of Airborne Observations | A.D.J. O'Neill,
Meteorological Branch, Toronto |
| 3.3 | 9.55 | Meteorological Rockets | J. Ray,
Meteorological Branch, Toronto |
| | 10.20 | Coffee | |
| 3.4 | 10.40 | Recent Developments in Surface Network Instruments | H. Gerger,
Meteorological Branch, Toronto |
| 3.5 | 11.05 | Techniques of Observing and Recording Ice Conditions in Canada | E. Stasyshyn,
Meteorological Branch, Toronto |
| 3.6 | 11.30 | Communicating Weather Information to the General Public | K. McGlenny,
Meteorological Branch, Toronto |
| 3.7 | 11.55 | The Use of Probability in Public Forecasts for the Prediction of Precipitation Occurrences | J.L. Knox,
Regional Meteorologist, Vancouver |

Afternoon - Tour - University of Toronto, and McLaughlin Planetarium

Evening - Dinner - Hart House, Guest Speaker - Dr. F.K. Hare

Thursday - May 29

4. HUMAN ASPECTS

Session 4

- 4.1 9.00 The Impact of Snow Hazard on
Urban Areas
- 4.2 9.30 Weather and People

Chairman - W.F. Hitschfeld
I. Burton,
University of Toronto

R.E. Munn,
Meteorological Branch, Toronto

5. POLLUTION

Session 5

- 5.1 9.55 Meteorology and Air Pollution
Control
- 10.20 Coffee
- 5.2 10.40 The Movement of Large-Scale Air-
Pollution Areas as Determined by
Satellite Photography
- 5.3 11.05 Temperature and SO₂ Profiles
in Montreal
- 5.4 11.30 Contributions from Air to the
Nutrient Load of Lakes and
Other Inland Waters

Chairman - W.F. Hitschfeld
L. Shenfeld,
Ontario Dept. of Health, Toronto

J. Clodman and C.I. Taggart,
Meteorological Branch, Toronto

C. East,
University of Montreal

R.A. Vollenweider,
Canada Centre for Inland Waters,
Burlington

6. DYNAMIC METEOROLOGY

Session 6

- 6.1 9.00 A Simplified Method of Computing
Stratospheric Heating Rates and
Associated Generation of Available
Potential Energy
- 6.2 9.30 Initialization by a Quasi-
Geostrophic Process
- 6.3 9.55 The Non-Linear Behaviour of
Geostrophic Waves in a Low-Order
Spectral Model
- 10.20 Coffee
- 6.4 10.40 Second Day Numerical Forecasts
of Precipitation Amount
- 6.5 11.05 The Application of the Tchebychef
Approximation Method to the
Objective Analysis of Meteorolog-
ical Fields
- 6.6 11.30 The Rational Selection of Predic-
tors for Research and Operations

Chairman - D.P. McIntyre
G. Paulin,
Meteorological Branch, Toronto

R. Asselin,
McGill University, Montreal

I.D. Rutherford,
McGill University

D. Davies,
Meteorological Branch, Montreal

Miss S. Boville,
McGill University, Montreal

James H.S. Bradley,
McGill University, Montreal

7. CLIMATOLOGICAL ANALYSES

Session 7

- | | | | |
|-----|------|---|---|
| 7.1 | 1.30 | A Hailfall Climatology of Southern Alberta | Chairman - D.N. McMullen
A.H. Paul,
University of Alberta |
| 7.2 | 2.00 | Climatic Analysis, A Tool for Water Resources Management | S.I. Solomon,
The Shawinigan Engineering Co. Ltd. |
| 7.3 | 2.25 | On the Role of Orographic Lift in the Precipitation Regime of Western Alberta | E.R. Reinelt,
University of Alberta |
| | 2.50 | Coffee | |

8. GENERAL METEOROLOGY

Session 8

- | | | | |
|-----|------|--|--|
| 8.1 | 1.30 | Some Thoughts on Evaluating the Distribution of Potential Evapotranspiration | Chairman - C. Penner
B.J. Garnier,
McGill University, Montreal |
| 8.2 | 2.00 | The Diurnal Pressure Wave in Western Canada | R.W. Longley,
University of Alberta |
| 8.3 | 2.25 | A Numerical Model to Study the Influence of Pressure Gradient and Friction on Fronts | G.V. Rao
Meteorological Branch, Toronto |
| | 2.50 | Coffee | |

Session 9 THE FUTURE OF APPLIED METEOROLOGY - Panel Discussion

Moderator - M.K. Thomas
Panel - J.P. Bruce, W. Hitschfeld,
G.A. McKay, J. Maybank

4.15 Closing Remarks

* Co-authors of paper 1.3 are:

R.H. Douglas, Macdonald College
J.D. Holland, Meteorological Branch
P.W. Summers, Res. Council of Alberta
C. Crozier, Meteorological Branch
T. Takeda, McGill University
W.F. Hitschfeld, McGill University
G. Vali, Macdonald College
J.P.S. McLaren, University of Saskatchewan
W. Baier, Canada Dept. of Agriculture

A B S T R A C T S

1.1

THE ROLE OF METEOROLOGY IN THE NATIONAL ECONOMY

P.D. McTaggart-Cowan

The role of meteorology in the national economy of Canada is constantly changing. As the economic activities of Canada become more complex and more sophisticated and as we recognize the need to become more truly competitive as we seek to reduce protective tariff barriers, we have to be continually aware of the benefits and costs of our climate and our weather.

Through an ongoing identification of these factors, research development and innovation can seek to maximize the advantages and minimize the disadvantages.

The paper will attempt to present not only a reasonable picture of the role of meteorology in the national economy today but to identify the main trends for the future and outline actions that should be taken immediately in support of identifiable national goals.

1.2

THE ROLE OF METEOROLOGY IN AGRICULTURAL PLANNING, DEVELOPMENT AND OPERATIONS

W. Baier

Meteorological services to Canada's agriculture include weather forecasts, advice and assistance in special meteorological matters and climatic data interpretation for the purpose of farming management and land-use planning. In established farming areas, the assistance of meteorology is required for decision making about farming activities such as planting, plant protection measures and harvesting operations, which are all affected by day-to-day variations of weather. In hitherto undeveloped or marginal farming areas, an assessment of the possible effects of climate on agricultural production is most needed.

Before this can be done successfully, universally adaptable mathematical models have to be developed from existing information in order to relate crop growth and development to weather parameters. The application of this knowledge to so far unproductive areas needs new approaches for interpolating or even creating climatic data. The efficient processing of large volumes of data and the development of complex crop-weather relationship models has become feasible with the advent of high-speed computers.

Only a beginning has been made in this field of agroclimatology. The potential value of climatic interpretations in relation to soils and crops as basis for future land-use planning has barely been recognized. Recent applications include irrigation requirements appraisals, ornamental plant zonation mapping, climatic estimates of Prairie wheat production and an assessment of the suitability of climate for growing wheat in the Peace River area. Research is conducted but meteorological services are as yet not available in the fields of weather modification, agricultural prediction and medium to long-range weather forecasts, which all have enormous potentials in Canada's agricultural industry.

1.3

WEATHER MODIFICATION - A SURVEY OF PRESENT STATUS WITH
RESPECT TO AGRICULTURE

J. Maybank et al.

This report was prepared for the tenth meeting of the National Committee on Agricultural Meteorology, January 28 and 29, 1969. The authors reviewed the history, theory and present status of weather modification processes aimed at increasing rain or reducing hail. Special problem areas such as cloud parameter and model characterisation, seeding materials and delivery, and experimental design are also discussed for their relevance to Canadian conditions. Legal aspects of weather modification are considered, particularly those applications of Canadian common law which might be invoked in conflict of interest situations. Finally, a significant part of the report deals with the potential benefits to Canadian agriculture from weather modification. The conclusion is that while hail suppression would be generally advantageous, any benefits from rainfall increase would be strongly dependent on region and crop condition. Thus any attempt to modify rainfall would be warranted only in certain parts of Canada in certain seasons, and only then when precise control of this modification with respect to time and area could be ensured.

1.4

METEOROLOGY AND WINTER SPORTS

Dr. G.O. Villeneuve

Meteorological support provided for winter sports activities, particularly skiing, over the past 25 years is discussed.

1.5

THE ROLE OF METEOROLOGY IN CANADIAN WATER RESOURCES PROBLEMS

J.P. Bruce

In the past decade many countries, including Canada have become increasingly aware of the importance of strong meteorological inputs to planning and development of water resources. Canadian activities in response to this awareness have resulted in successful approaches to a number of problems. Some examples include studies of rainfall intensities for drainage design, estimation of maximum floods, and meteorological participation in the Canadian International Hydrologic Decade program. On the other hand, the recent Science Secretariat and Science Council surveys of Water Resources Research suggest a number of problems which have not yet received adequate attention, such as design and operation of co-ordinated meteorological and hydrological networks, weather modification for improved water resources management, chemical composition of rainfall and dustfall and their importance in water quality problems, and development of river forecasting techniques and services. Some suggestions are offered concerning ways in which better progress might be achieved in the latter group of problems.

1.6

METEOROLOGY AND ELECTRICAL UTILITIES

D.K.A. Gillies

Meteorology affects the supply of raw material used for energy production, jeopardizes the effectiveness of production machinery and delivery system, changes the demand for the finished product and affects public relations.

A general explanation will be made, with examples, of the role of meteorology in the design and operation of one of the largest utilities in North America; details will indicate the correlation between weather and the variability of electrical energy demands.

1.7

WEATHER AND THE CONSTRUCTION INDUSTRY

D.W. Boyd

The weather affects the construction industry in two distinct ways. In the first place buildings should be designed to protect the occupants or the contents from inclement weather. Secondly, the weather during the construction period may occasionally be sufficiently severe to interfere with or even prevent work.

The climatological data and forecasts now available provide the builder with most of the useful information on precipitation, temperature and wind. There are, however, some unanswered questions and plenty of room for improvement in some of the answers already given.

1.8

WEATHER SERVICES FOR LAND TRANSPORTATION

K.T. McLeod

Studies have shown that the susceptibility of many forms of land transport to the influence of weather conditions increases significantly as technical progress is made. Increasing sophistication of equipment and greater reliance on mass transport arising from urbanization and the desire and need to travel have evidently not lead to man becoming more independent of weather conditions. They have, in many cases, complicated the dependence, particularly when modes of transport are developed without due regard to the influences of weather and climate. Some of these influences and their relationship with and impact on land transport will be described.

1.9

RESOURCE DEVELOPMENT IN ARCTIC CANADA

E.R. Weick

This paper touches on various aspects of resource development including resource potential, inputs of private and public capital into exploration and infrastructure, the marketability of Arctic resources, incentive program, the need for transportation development, and the requirements for support services such as meteorology.

2.1

SIMILARITY OF TURBULENT TRANSFER OF HEAT AND MOMENTUM
ACROSS THE AIR-SEA INTERFACE

M. Miyake, G. McBean

The transfer of momentum and heat across the air-sea interface is very important to the circulations of both the atmosphere and ocean. A 3-dimensional sonic anemometer has been used to investigate these fluxes by the direct method. Spectra and cospectra of the turbulent parameters have been investigated with regard to similarity.

ANALYSIS OF THE WIND-SPEED PROFILES IN THE SURFACE BOUNDARY LAYER

O. Koren

Wind profile analyses are performed on 170 wind profiles which were obtained at the Suffield Experimental Station during the 1954-1967 period. A comparison of the results, obtained through the use of the power law, logarithmic law and log-linear law, is made. It is found, for example, that the power law fits the data in the surface - 92 m. layer more accurately than does the logarithmic law. A number of results obtained in this study are found to be in agreement with those found by an independent investigation at the Suffield Experimental Station. The results from this investigation are also compared with those obtained at the Brookhaven National Laboratory and at a number of other locations.

2.3 ON AIR-BORNE MEASUREMENTS OF THE VERTICAL FLUXES OF MOMENTUM, HEAT AND WATER VAPOUR

M. Miyake and M. Donelan

Traditionally the micro-processes of the air-sea coupling have been studied from offshore towers with measurements of meteorological parameters at a point. By using fast response turbulence sensors on an aircraft along with an aircraft motion sensing system, one can estimate the transports of momentum, heat and water vapour and assess their horizontal and vertical variability. The estimates of the fluxes over the open sea, during all weather conditions are derived from 1) the eddy correlation method, 2) the power spectral density in $-5/3$ region.

Some results of experiments, using a 'Beechcraft Queen Air 80', over the Pacific off Vancouver Island and over the Gulf of Mexico near New Orleans at altitudes of 8 m to 100 m are discussed.

2.4 CORRELATIONS OF TURBULENCE ELEMENTS MEASURED AT VERTICALLY SEPARATED POINTS

O. Johnson and B. Larson

The fluctuations of the vertical and horizontal angles of the wind vector are measured at three points on a mast. Correlations are computed at all lags up to two minutes. Experiments were conducted in a wide variety of stability and wind regimes. Typical results are presented in graphical form. Some possible applications are suggested.

2.5 THE LIMITATIONS ON THE USE OF AN AIRPLANE AS A WIND SENSOR

E.G. Morrissey

The use of measurements of airplane motion to compute horizontal and vertical wind velocities is discussed. The scales of wind fluctuations which can be sensed by this type of airplane instrumentation are estimated using the equations of motion as applied to an airplane. The spectral

aspects of the problem demonstrate that the errors involved depend upon both the scale of the fluctuations and on the type of flight program. The case of mountain wave measurements is used as an example. In addition, the application to other meteorological problems is considered.

2.6

BOMEX EXPEDITION

M. Miyake

As a preliminary programme of GARP, an area study is planned in the tropical ocean off the island of Barbados. Members of the Institute of Oceanography of the University of British Columbia have participated in the determination of surface turbulent fluxes from Flip and an aircraft. Their field experience will be described with preliminary findings.

2.7

GENERATION AND DEVELOPMENT OF CONVECTIVE CLOUD PRODUCED BY EXPLOSION OF 500 TONS OF TNT AT SUFFIELD

J.A. McCallum

The cloud of hot gas arising from the detonation of 500 tons of TNT was photographed in a sequence with 1 second intervals between consecutive frames. The typical mushroom cloud appeared, changing into a cloud of more normal cumulus appearance which reached a height of 3100 metres, 4 minutes after zero; thereafter it spread out into stratocumulus cumulonimbus. Rate of rise and rate of expansion are given as functions of time. Comparison is made with similar clouds produced by explosions of lower yield, and with theory.

3.1

MEASUREMENT OF INFRARED EMISSION FROM WATER VAPOUR IN THE STRATOSPHERE

A.W. Brewer and K.P.B. Thomson

A balloon born radiometer that measures the downward flux from water vapour has been developed by the Atmospheric Physics Group at the University of Toronto.

The optical filter system devised for the sonde makes it sensitive to the radiation emitted by atmospheric water vapour in the 20 - 60 micron region.

The development of the infrared detection system and its associated electronics are described and the interpretation of the flux measurement is discussed.

3.2

HYDROLOGICAL APPLICATIONS OF AIRBORNE OBSERVATIONS

A.D.J. O'Neill

Current techniques of airborne observation and their applications to hydrology are discussed with specific emphasis on remote sensing from earth satellites. Results are presented from a satellite study of snow cover in Western Canada.

METEOROLOGICAL ROCKETS

J. Ray

The type of data collected by meteorological rockets is reviewed and discussed with regard to accuracy and ease of collection. The more common types of meteorological rockets being used (the Arcas and Boosted Dart) are described in some detail. Mention is made of the Meteorological Rocket Network (MRN) and the Experimental Inter-American Meteorological Rocket Network (EXAMETNET), their coverage and firing schedules. A brief look is taken at areas of future development in the field.

RECENT DEVELOPMENTS IN SURFACE NETWORK INSTRUMENTS

H. Gerger

New instruments and systems are being developed, and improvements to existing instruments are being made, in response to updated network requirements and the continuing need to increase overall operating efficiency.

This discussion briefly describes some of the recent developments in surface instrumentation in the Meteorological Branch, and indicates their significance to network operations.

TECHNIQUES OF OBSERVING AND RECORDING
ICE CONDITIONS IN CANADA

Emil Stasyshyn

Due to economic factors and scientific studies considerable attention has been focused on the importance of adequate observing and reporting of ice conditions, as affecting shipping during periods of ice congestion. With this accelerated interest in ice conditions, techniques have been developed to obtain a "synoptic picture" of ice conditions. The ice conditions are observed from aircraft, shipboard and shore stations including actual ice thickness measurements.

COMMUNICATING WEATHER INFORMATION TO THE GENERAL PUBLIC

K. McGlening

The largest single group endeavouring to apply meteorology to daily activities is the so-called general public. But even pre-supposing a perfect meteorological product to meet the needs of the public, there remain two important areas which require more attention: (1) delivering information to the user and (2) expressing the advice in terms which reflect the meteorologist's thinking with clarity and precision.

Some alternative methods of improving the present Canadian weather services in the areas indicated above are discussed and suggestions made for facilitating the useful application of meteorological advice for the layman.

3.7

THE USE OF PROBABILITY FACTORS IN PUBLIC FORECASTS
FOR THE PREDICTION OF PRECIPITATION OCCURRENCE

J.L. Knox

This paper will examine the feasibility of using probability factors for the prediction of precipitation occurrence, both from the view of the forecaster and that of the user. Recommendations for a Canadian weather service test program will be outlined, and the problem of verification will be discussed.

4.1

THE IMPACT OF SNOW HAZARD ON URBAN AREAS

I. Burton

In the context of the present debate on science policy, this paper argues the need to set research priorities in terms of social need and social relevance. In the fields of meteorology and climatology increased emphasis is needed on the social and economic aspects of weather and climate. To illustrate the general case reference is made to a study of the impact of snow hazard in urban areas including Toronto.

4.2

WEATHER AND PEOPLE

R.E. Munn

The response of a person or a population to meteorological stress cannot be predicted easily. "Comfort" has been defined as the absence of stress but the comfort zone varies across a population and also for a single person. Calculation of a human water budget or heat balance therefore is not an exact predictor of comfort. Some of the problems that arise are illustrated with three examples: damp cold versus dry cold, wind chill, and heat stress.

5.1

METEOROLOGY AND AIR POLLUTION CONTROL

L. Shenfeld

The effects of meteorological parameters on the dispersion of pollutants are examined with relationship to two classes of pollutant sources with the object of determining criteria for forecasting air pollution potential.

The meteorologist's success of air pollution potential forecasting for a locality is shown to be dependent on a knowledge of the location and height of emission of the principal sources of the pollutants, the topography and its micrometeorological effects as well as obtaining good prognostic charts.

Industry may, by interrupting or changing its production methods, use an air pollution potential forecasting service to save on the expenditure of costly pollution control equipment and high stacks.

5.2

THE MOVEMENT OF LARGE-SCALE AIR-POLLUTION AREAS
AS DETERMINED BY SATELLITE PHOTOGRAPHY

J. Clodman and C.I. Taggart

The particulate matter in large intense areas of air pollution can be detected on weather satellite photography by skilled photo-interpreters. A few such cases have been studied in respect to the associated meteorological conditions and the movement of the polluted air. These studies suggest that the air-pollution problem is changing from a purely local and regional one to one that has inter-continental and hemispheric implications.

5.3

TEMPERATURE AND SO₂ PROFILES IN MONTREAL

Conrad East

Helicopter soundings up to 3,000 feet at 11 sites in Montreal have been completed some 35 times in February, March and April 1968 and some 30 times from September 1968 to January 1969. These experiments yielded a unique set of temperature and SO₂ concentration profiles over a city.

A few of these profiles will be selected to illustrate the space and time variation of temperature and SO₂. Preliminary results concerning the dependence of the vertical temperature distribution on the wind speed and the dependence of the SO₂ concentration at each site on the wind direction will also be presented. Color photographs of the city smog will be added to the presentation.

5.4

CONTRIBUTIONS FROM AIR TO THENUTRIENT LOAD
OF LAKES AND OTHER INLAND WATERS

Dr. R.A. Vollenweider

Eutrophication, i.e., enrichment of lakes and other inland waters by algal nutrients, is a growing problem in many American and European countries. As the most troublesome factors, nitrogen and phosphorus, which come primarily from domestic and industrial sewage discharges and from agricultural land run-off, have been identified. However, among other sources involved, also aeolian nutrient depositions have increased considerably during recent years, and their contribution to the total loading of inland waters can no longer be neglected.

6.1

A SIMPLIFIED METHOD OF COMPUTING STRATOSPHERIC
HEATING RATES AND ASSOCIATED GENERATION
OF AVAILABLE POTENTIAL ENERGY

Dr. G. Paulin

A method of computing the stratospheric heating rates from daily available data of the Northern Hemisphere is given. It consists of a hybrid approach using both the simple parametric equations in the solar ultra-violet

absorption and the radiative transfer equations in the long-wave spectrum (15-micron carbon dioxide and 9.6-micron ozone absorptions). This method has been applied in the stratosphere for the period 12 to 16 January 1959 in order to compute the generation of available potential energy. The results indicate that the method is sufficiently accurate to enable one to describe synoptically some of the aspects of the radiative exchange between troposphere and stratosphere as well as being suitable for energy budget studies over longer periods of time.

6.2

INITIALIZATION BY A QUASI-GEOSTROPHIC PROCESS

R. Asselin

By expanding the horizontal wind vector in terms of the geostrophic wind, then neglecting all but the first two terms and by considering the other meteorological equations as usual, a linear second-order partial differential equation with variable coefficients can be obtained and the three-dimensional wind diagnosed from the pressure field. The constraint on the vorticity is weaker than the corresponding one for the balance equation. A relaxation method has been devised to solve the system and the results for a barotropic atmosphere are compared with those of the balance equation. It is found in particular that large negative absolute vorticities are often computed but that this has very little consequence on forecasts. The main disadvantage of this method is the large computer memory requirement; however this is largely offset by its speed as compared with that of the ordinary non-linear balance equation.

6.3

THE NON-LINEAR BEHAVIOUR OF GEOSTROPHIC WAVES IN A LOW-ORDER SPECTRAL MODEL

I.D. Rutherford

The vertical structure of geostrophic waves, as a function of their horizontal scale and of the vertical profiles of zonal wind and temperature, is studied by means of time integrations of a highly simplified spectral baroclinic model. The model succeeds in duplicating many aspects of the observed behaviour of the atmosphere, including the propagation to great heights of the largest scale waves in a typical winter zonal wind profile, with the subsequent breakdown of the zonal circulation.

6.4

SECOND DAY NUMERICAL FORECASTS OF PRECIPITATION AMOUNT

David Davies

The three-layer precipitation scheme has now been in operational use at the Central Analysis Office for over a year. Attempts are being made to extend the useful period of the forecasts from 36 hours to 48 hours. This is being done mainly by introducing new physical effects into the baroclinic model. These include the eddy diffusion of potential vorticity, the effects of release of latent heat, ocean heating, radiation, and variable stability (including a tropopause).

6.5 THE APPLICATION OF THE TCHEBYCHEF APPROXIMATION METHOD TO THE
OBJECTIVE ANALYSIS OF METEOROLOGICAL FIELDS

Susan P. Boville

Analytic functions have been applied to the analysis of 500 millibar hemispheric height observations and compared to the standard grid point representation. In this study, spherical harmonic functions were determined through application of the Tchebychef approximation method. Variances were compared with the Central Analysis Office's charts and the results showed comparable field specifications. Gross error elimination is also inherent in the analysis procedure.

6.6 THE RATIONAL SELECTION OF PREDICTORS FOR
RESEARCH AND OPERATIONS

James H.S. Bradley

The characteristic pattern (empirical orthogonal function; natural function; factor) analysis of correlation fields has the advantage over the equivalent multiple regression that one can estimate the variance explained by the selected predictors for the prediction of any point in the field. In problems equivalent to a numerical integration, such as estimation of the areal mean precipitation or the geopotential at grid points from station data, characteristic patterns give the optimal weight for each point. The possible increase in information by new observations may be estimated, e.g. for multi-level numerical prediction models.

7.1 A HAILFALL CLIMATOLOGY OF SOUTHERN ALBERTA

Alexander H. Paul

This paper describes a climatological analysis of two years of hail reports from the co-operative observing network in southern Alberta. The results are compared with those of an earlier analysis of a much larger body of data collected by the Alberta Hail Studies in central Alberta. It appears that the hailstorm models being developed through the intensive study in this area are in general applicable also to the south of the province, though certain climatological differences are noted.

7.2 CLIMATIC ANALYSIS, A TOOL FOR WATER RESOURCES MANAGEMENT

S.I. Solomon

Climatic data can be very useful in assessing the merits of various water resources projects and in controlling their operation. Unfortunately, the time and space coverage of climatologic data is intermittent and this results in difficulties in their practical use in this field. Since there is a close interrelationship between hydrologic and climatological data, there are possibilities of coordinated

analysis of these two series of data enabling the synthesis of missing information, both in the climatic and hydrologic series. Three examples of such analysis: one for the coordinated determination of mean annual precipitation, evaporation and runoff; the second for the coordinated determination of storms and floods; and the third in the area of parametric hydrometeorologic models, are given as an illustration of the vast possibilities available in this applied research field.

7.3

ON THE ROLE OF OROGRAPHIC LIFT IN THE
PRECIPITATION REGIME OF WESTERN ALBERTA

E.R. Reinelt

Orographic precipitation on the eastern slopes of the Rocky Mountains contributes significantly to the water resources of the Western Prairies. Analysis of the precipitation patterns and wind fields in Western Alberta shows that the orographic component of precipitation on the eastern slopes depends markedly on the speed and depth of the easterly zonal wind. Shallow upslope circulations below the 800 mb level tend to generate extensive layers of stratus, but at best only light precipitation. Deep upslope circulations in the 800 - 500 mb layer, on the other hand, will usually produce heavy and widespread precipitation in all seasons of the year.

8.1

SOME THOUGHTS ON EVALUATING THE DISTRIBUTION OF
POTENTIAL EVAPOTRANSPIRATION

B.J. Garnier

A knowledge of the distribution of potential evapotranspiration is basic to evaluating the water balance and applying the concept in various aspects of applied meteorology. A great deal of research has gone into improving the point estimation of potential evapotranspiration from climatic data. Good point values, however, do not necessarily imply an equal accuracy in the distribution pattern achieved by subsequent interpolation over topographically variable areas. The paper will discuss a solution to this problem by examining a method for evaluating topographic variations in radiation income as a basis for evaluating the distribution of potential evapotranspiration.

8.2

THE DIURNAL PRESSURE WAVE IN WESTERN CANADA

Richmond W. Longley

An analysis of mean hourly pressure data for stations in Alberta and British Columbia for January and July show marked diurnal variations. The 12-hr wave is found to fit into the pattern discovered by other scientists. The 24-hr wave is well marked and shows variations that result from topography and from the contrast between land and ocean. Observations from two stations above 2 km show differences which would appear to arise because of their different locations relative to the area of mountain ridges.

A NUMERICAL MODEL TO STUDY THE INFLUENCE
OF PRESSURE GRADIENT AND FRICTION ON FRONTS

G.V. Rao

The Dynamic treatment of fronts in relation to surface and internal friction is examined by numerical means. Special double theodolite observations are made use of in the development of a simple numerical model to reproduce some of the principal characteristics, e.g. slope, height and vertical circulation, of quasi stationary and cold fronts.

CANADIAN METEOROLOGICAL SOCIETY

3rd Annual General Meeting, 7 p.m. Tuesday, May 27, 1969.
University of Toronto

AGENDA

The President in the Chair

1. Minutes of 2nd Annual General Meeting, Calgary, June 3, 1968.
2. Reports of the Executive Committee
 - (a) Annual Report of C.M.S.
 - (b) Treasurer's Report
 - (c) Nominating Committee Report
 - (d) Editor's Report
 - (e) Prize Committee Report
3. Reports from Local Centres
4. Budget for period 1 Jan. 1970 to 31 Dec. 1970
5. Amendments to the Society's By-laws
6. Future of the Society
7. 1970 Congress
8. Other Business
9. Installation of officers

CANADIAN METEOROLOGICAL SOCIETY

Minutes of the Second Annual General Meeting of the Canadian Meteorological Society held at University of Calgary, Calgary, Alberta, Monday, 7:30 p.m., June 3, 1968.

1. Presentation of Patterson Medal

The President of the Canadian Meteorological Society, Professor A.W. Brewer called upon Mr. D. Smith, Regional Meteorologist to present the Patterson Medal. On behalf of the Director, Meteorological Branch, Mr. Smith, presented the Medal to Professor B. Currie, University of Saskatchewan. The Society, is very honored to have Professor Currie, one of its active members, receive the Patterson Medal.

2. Minutes of the 1st Annual General Meeting of the Canadian Meteorological Society held May 25, 1967, at Carleton University, Ottawa, Ontario.

Prof. W. Hitschfeld moved that the minutes of the 1st Annual General Meeting be approved. Seconded by Dr. A. Thomson. Carried.

3. Reports of the Executive Committee

a) Annual Report of the CMS

Mr. H. Cameron moved that the report as published be approved. Seconded by Mr. J.M. Tissot Van Patot. Carried.

b) Treasurer's Report

Mr. H. Cameron moved that the Report as published be approved. Seconded by Prof. I.Y. Ashwell. Carried.

c) Nominating Committee's Report

Prof. R.H. Douglas, a member of the Nominating Committee moved that the following be considered for office during 1968-69:

Executive

President	- M.K. Thomas
Vice President	- J.P. Bruce
Treasurer	- L. Shenfeld
Corresponding Secretary	- J.D. Holland
Editor	- J.A.W. McCulloch
Recording Secretary	- G.L. Pincock
Past President	- Prof. A.W. Brewer

Councillors at Large

Dr. P.W. Summers
Rev. Father C. East
Prof. J.B. Gregory

Auditor - R.D. Easto

No nominations were received from members at large. The Chairman declared the nominees elected.

d) Editor's Report

Mr. J.A.W. McCulloch moved that the Report as published be approved. Seconded by Dr. Bhartendu. Carried. The Chairman, following the discussion on this Item advised that an information letter would be provided by the Editor giving the reason for delays and non-receipt of copies by members, the Issue Number and their date of issue, and a request that any member not having received a copy to provide this information direct to the Editor.

e) Prize Committee Report

The President, Prof. A.W. Brewer, presented the 1967-68 awards to the following:

i. President's Prize - Dr. A. Rebert

"An integration of the primitive meteorological equations in terms of spherical harmonics", in Proceeding of International Symposium, Moscow p.p. 66-69. Published 1967.

ii. Prize in Applied Meteorology - Dr. A. Davenport

a) "Instrumentation and measurement of wind speed spectra in a city", in Proceedings, First Canadian Conference on Micrometeorology, p.p. 361-368. Published 1967.

b) "The dependence of wind loads on meteorological parameters", Pre-print International Research Seminar: Wind Effects on Buildings and Structure, Ottawa, 1967.

iii. Undergraduate Student Prize

The Dr. A. Thomson Prize - S. Clodman

"A pilot study of climatological rainfall pattern around Malton, Ont.", Meteorological Branch, Tec. 640(1967).

iv. Graduate Prize - S. Woronko

"Calculations of the infra-red heating role in the atmosphere", Masters' Thesis 1967, McGill University, Dept. of Meteorology.

f) Report on the Society's participation in the Canadian Science Fair

Mr. J.B. Wright, Chairman, B.C. Centre gave a report on the participation of the Society in the seventh Canada-Wide Science Fair held at University of B.C., May 10 and 11, 1968. The winner of the Society's prize of two books - The Science of Weather, by John A. Day, and the Glossary of Meteorology, AMS - was a 17 year old student, James Kennedy of Regina.

The presentation of the Society Prize to Mr. Kennedy will be arranged by the Executive and the Regional Head of the Youth Science Foundation.

Mr. J.B. Wright moved that the Executive arrange to provide for the Eighth Annual Canadian National Science Fair some form of an award for the best exhibit dealing with meteorology or related field. Seconded by J.M. Tissot Van Patot. Carried.

4. Reports from the Local Centres

Reports from the following Local Centres were presented.

British Columbia Centre	- J.B. Wright
Alberta Centre	- R.G. Stark
Winnipeg Centre	- P.J. Pender
Toronto Centre	- H.A. Thompson
Ottawa Centre	- D. Wright
Montreal Centre	- J.M. Tissot Van Patot
Halifax Centre	- H. Cameron

5. Budget for Period 1 Jan. 69-31 Dec. 69

The Budget was reviewed by H. Cameron who moved that it be approved. R.B.B. Dickison, moved that the Membership Fees be amended to read - general membership \$7.50, student \$1.00. Dr. W.A. Godson seconded the motion as amended by R.B.B. Dickison. Carried.

6. Publication Policy for the Society

J.A.W. McCulloch reviewed the draft Publication Policy for the Society and moved that it be approved. Following discussion on the contents of the official publication - Atmosphere, it was moved by Prof. B.W. Boville that, the motion be amended to include - "the official business and transaction be published in the official publication of the Society". The motion as amended was seconded by Dr. J. Maybank. Carried.

Dr. J. Maybank moved a vote of thanks to the Editor and his staff for their efforts in making Atmosphere a success during the period 1967-68. Seconded by R.B.B. Dickison. Carried.

7. Amendment to the Society's By-Law

M.K. Thomas moved that By-Law 4 paragraph (c) be amended to read:

- c) On or before March 1st the Corresponding Secretary shall send to each member of the Society.
 - i. a list of the members of the current Council
 - ii. a list of the nominations made by Council or the nominating committee, and
 - iii. a copy of By-Law 4(d)

Seconded by J.M. Tissot Van Patot. Carried.

8. Other Items

1. Regina Centre - Information was provided that a formal request would be made to the Executive to have a local centre formed at Regina, Saskatchewan.

2. Quebec City Centre - The Chairman reviewed the request by Dr. G.O. Villeneuve for the formation of a Local Centre at Quebec City. Dr. Villeneuve was invited to elaborate on this request. He confirmed that "La Societe de Meteorologie de Quebec" had given careful consideration to becoming a Local Centre under the Constitution and By-Laws of the Canadian Meteorological Society. The Chairman thanked Dr. Villeneuve for his remarks. The proposal for a new Local Centre was received by a hearty applause from the Members.

3. Joint RMS/AMS Meeting, London, August 1968

A proposal that the CMS participate in the joint meeting was made by Prof. J.S. Marshall, on behalf of Prof. F.K. Hare, President RMS. Following discussion Prof. B.W. Boville moved that the CMS Council be authorized to make a final decision on the proposed offer. Seconded by J.M. Tissot Van Patot. Carried.

9. Installation of New Officers

The President, Prof. A.W. Brewer, welcomed the incoming Council. Dr. J. Maybank moved a vote of appreciation to the outgoing Council. Seconded by J.M. Tissot Van Patot. Carried.

10. The Meeting was adjourned at 9:00 p.m. Following the meeting members were guests of the Alberta Centre at a Social.

ANNUAL REPORT
CANADIAN METEOROLOGICAL SOCIETY

The Canadian Meteorological Society continued to grow in its second full year of life, adding two new Local Centres during 1968 and showing a net increase of 43 members over the year. Membership as of April 1, 1969 was 554 including 73 student members as compared with 511 including 58 students a year ago.

Local Centres

Two new Local Centres were formed during 1968, the Regina Centre being officially approved by Council on September 12, 1968, and La Société de Météorologie de Québec being accepted by the Council as the Quebec Centre of the Canadian Meteorological Society on December 19, 1968.

Second Annual Congress of the C.M.S.

The Second Annual Congress of the Society was held at the University of Calgary on June 3-5, 1968. Under the capable direction of Program Committee Chairman Roy Lee, six scientific sessions were held under the titles "Upper Atmosphere", "Tropospheric Circulation", "Arctic Meteorology", "Alberta Hail Studies", "Physical Meteorology", and "Planetary Boundary Layer". Tours of the Marmot Creek Experimental Watershed Basin and the Alberta Hail Project Field Headquarters were a feature of this Congress. Local arrangements for the Congress were taken care of by a local committee chaired by Mrs. R.E. Chambers, Assistant Professor, Department of Geography, University of Calgary, whose efforts contributed in no small measure to the success of the Congress.

Second Annual General Meeting

The Second Annual General Meeting of the Society was held at the University of Calgary on June 3, 1968 at 7:30 p.m. At this meeting Mr. D. Smith, Regional Meteorologist, acting on behalf of the Director of the Meteorological Branch, presented the Patterson Medal to Professor B.W. Currie, University of Saskatchewan.

The Council and National Executive for 1968-69 were elected as follows:

President:	- M.K. Thomas
Vice-President:	- J.P. Bruce
Treasurer:	- L. Shenfeld
Corresponding Secretary:	- J.D. Holland
Editor:	- J.A.W. McCulloch
Recording Secretary:	- G.L. Pincock
Past President:	- Prof. A.W. Brewer
Councillors-at-large:	- Dr. P.W. Summers
	- Rev. Father C. East
	- Prof. J.B. Gregory
Auditor:	- R.D. Easto

The Society Prizes for 1967 were presented by the President, Prof. A.W. Brewer, as follows:

Presidents Prize: Dr. A. Robert
Prize in Applied Meteorology: Dr. A. Davenport
The Dr. Andrew Thomson Undergraduate
Student Prize: S. Clodman
The Graduate Student Prize: S. Woronko

It was voted to raise the fee for general membership in 1969 to \$7.50.

Annual Dinner

The Annual Dinner of the Society was a western style barbecue held at the Rafter Six Ranch at 6:30 P.M. on June 4 following the field trip to the Marmot Creek Experimental Basin which took place in the afternoon. Both these excursions were thoroughly enjoyed by all who took part.

GARP Planning Workshop

On Friday, June 7, following the Congress and the June 6 field trip to the Alberta Hail Project, a Planning Workshop on GARP sponsored by the Canadian Meteorological Society, the Meteorological Service of Canada and the Subcommittee on Meteorology and Atmospheric Sciences was held at the University of Calgary. The purpose of this workshop was "to consider, and advise all concerned, on the scientific objectives and scientific project priorities in a Canadian GARP programme and outline fields in which Canada has special responsibilities and/or special competence". A very successful one-day workshop was held, and a report on the proceedings and recommendations of the workshop produced by the organizing committee. The Society is also planning to participate in the Conference on GARP to be held in London, England, 25-29 August 1969.

Conferences

During 1968, the Society was a co-sponsor, along with the American Meteorological Society, the National Research Council, and others, of two international conferences which met in Canada: The 13th Radar Meteorology Conference held at McGill, August 20-23, and the Third International Conference on Cloud Physics held at the University of Toronto, August 26-30.

Other Activities

Among other activities in which the Society participated during 1968 was the Canada-wide National Science Fair, held at the University of British Columbia, at which the Society provided an award (also judging) for the best exhibit dealing with meteorology or a related field. The 1969 National Science Fair is being held at Regina, May 8 to 10, 1969, and is being supported by the Society in a similar fashion. The Society also submitted a brief to the Special (Senate) Committee on Science Policy, and helped arrange for the national tour of Dr. Ken King who visited Centres of the Society during the winter of 1968-69 in a tour sponsored by the Meteorological Branch.

The Society continued to experience growing pains associated with its tender age, increasing membership, and with the withdrawal of services formerly provided by the Meteorological Branch. Although the latter loss has been partially offset by a financial grant from the Branch, it is becoming increasingly clear that this trend toward independence from the Branch must be continued. To this end, the Society changed its address from 315 Bloor Street West to a Post Office Box number during 1968, and it is proposed to continue to reduce the ways in which the Society depends upon the Branch. In order to accomplish this, it will be necessary to establish some form or forms of paid help and/or a national office with paid staff. The 1970 Budget proposes the first tentative steps in this direction.

CANADIAN METEOROLOGICAL SOCIETY
STATEMENT OF RECEIPTS AND EXPENDITURES
FOR THE YEAR ENDED DECEMBER 31, 1968

RECEIPTS

1967 Fees	\$ 327.00	
1968 Fees	1525.00	
1969 Fees	<u>116.00</u>	\$ 1968.00

OTHER INCOME

Bond Interest	\$ 51.00	
Bank Interest	18.16	
Dividends - Bell Telephone	37.44	
Subscriptions to Atmosphere	<u>28.00</u>	<u>134.60</u>

TOTAL RECEIPTS

\$ 2102.60

EXPENDITURES

Centres - expenses	\$ 104.75	
Prizes - Canada Wide Science Fair	24.10	
Bank Charges and exchange	17.41	
Atmosphere - Printing and Mailing	\$ 2972.07	
Postage	195.00	
Stationery and Printing	219.81	
		<u>\$ 3533.14</u>

Bank Balance - January 1, 1968	\$ 2387.01
Plus Receipts 1968	2102.60
Less Expenditures 1968	<u>3533.14</u>
	\$ 956.47

Balance - Bank of Montreal - December 31, 1968	\$ 674.07
Canadian Imperial	
Bank of Commerce - December 31, 1968	<u>282.40</u>
	<u>\$ 956.47</u>

CANADIAN METEOROLOGICAL SOCIETY
BALANCE SHEET AS OF DECEMBER 31, 1968

ASSETS

Bank Balance - December 31, 1968		\$ 956.47	
Bonds - Market Value December 31, 1968			
\$1,000 Government of Canada 3 $\frac{1}{2}$ % - 1978		770.00	
300 Government of Canada 4 $\frac{1}{2}$ % - 1983		222.00	
Bell Telephone - Market Value December 31, 1968			
12 shares at \$46 $\frac{1}{8}$		<u>553.50</u>	\$2,501.97

LIABILITIES

1969 CMS fees paid in advance		\$ 116.00	
Surplus December 31, 1967	\$3,070.51		
Deficit for year 1968	<u>684.54</u>	2,385.97	\$2,501.97

AUDITOR'S REPORT

I have examined the records of the Canadian Meteorological Society and am satisfied that the Treasurer's Report presents a proper statement of the Branch's financial position as at December 31, 1968.

R.D. Easto,
Auditor.

"ATMOSPHERE"
STATEMENT OF INCOME AND EXPENDITURES
CASH ACCOUNTS YEAR ENDING DECEMBER 31, 1968

Receipts

From Canadian Meteorological Society	\$ 250.00	
Reprints	46.00	
Advertising	80.00	
Subscriptions	<u>17.50</u>	\$ 393.50

Expenditures

Stationary and Printing	\$ 76.01	
Typing	78.50	
Bank Charges	5.00	
Postage	112.32	
Addressograph Work	<u>37.50</u>	<u>\$ 309.33</u>

Balance as per Bank Statement December 31, 1968		<u>\$ 84.17</u>
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NOMINATING COMMITTEE REPORT

The Nominating Committee, consisting of Mr. H. Cameron (Chairman), Prof. B.W. Boville and Mr. D. Wright, makes the following nominations for 1969-70:

President	- M.K. Thomas
Past President	- A.W. Brewer
Vice President	- D.N. McMullen
Treasurer	- L. Shenfeld
Recording Secretary	- G.L. Pincock
Corresponding Secretary	- J.D. Holland
Editor	- E. Truhlar
<u>Councillors-at-large</u>	
	- Prof. K.D. Hage
	- J. Knox
	- Rev. Father C. East
<u>Auditor</u>	
	- R.D. Easto

All nominees have confirmed their willingness to stand for election.

ATMOSPHERE

During 1968, five issues were published; these were numbers 3 and 4 of volume 5 and the first three issues of volume 6. At the end of the year, number 4 of volume 6 was at the printer. Thus, to all intents and purposes, publication was back on schedule. These five issues contained thirteen papers and numerous notes.

With volume six, several innovations were made. The size was increased to 8" x 10". An I.B.M. "Executive" typewriter was used to prepare the copy. In spite of being cleaner and sharper copy, the type was unpopular with many members because it was all upper case. For volume 7, other arrangements have been made.

It became necessary during the year to introduce breaks in the articles. The necessity arose because of the policy of providing fifty free reprints to authors. The cost of continuous articles with no breaks and the free reprints was prohibitive.

The editorial staff has continued to learn through making errors of judgment and outright mistakes. The pagination has often been less than efficient, from the reader's point of view, and it is hoped that experience will improve this. On one issue, the incidence of typographical errors reached an embarrassing level; in particular, the article by G.D.V. Williams in Volume 6, number 3, was a disaster. This makes the need for proofreading by the author more evident. Perhaps the new editor will be able to introduce this step into the process.

There is still a decided lack of support by many of the members. My heartfelt thanks go to those who have contributed, and to Ted Munn who has inveigled several people into contributing. Because of the length

of the cycle time for one issue, news is never hot, but many news items are just as interesting to members three months after the fact. Each member should consider it a personal responsibility to forward any news item that he comes across to the Editor.

My thanks go to those listed on the inside of the front cover. There have been many hours spent in your behalf by them. I am sure that they will provide the same support for your new Editor. Finally, I don't know whether I should offer to the new Editor my congratulations or my condolences.

J.A.W. McCulloch

PRIZE COMMITTEE REPORT

The 1968 Prize Committee consisted of Professor R.W. Longley (Chairman), Professor R. List and Mr. G.A. McPherson. The following awards are recommended by the Prize Committee:

President's Prize: Dr. A.W. Brewer for his paper "The regions of formation of atmospheric ozone" published in the Quarterly Journal of the Royal Meteorological Society, Vol. 94, 249-264, July 1968.

Prize in Applied Meteorology: Mr. D. Davies for his report "Three-layer numerical forecasts of precipitation amounts" published as Canadian Meteorological Memoir No. 25, plus his report with M. Olson, "Operational Forecasts of 24-hour precipitation amount from the Central Analysis Office Computer", published as Canadian Met. Branch TEC 670, April 1968.

Graduate Student Prize: No recommendation.

Dr. A. Thomson Undergraduate Student Prize: Mr. I.R. Graham, for his paper "An Analysis of Turbulence Statistics at Fort Wayne, Indiana", published in the Journal of Applied Meteorology, Vol. 7, 90-93, 1968.

ANNUAL REPORTS FROM CENTRES

VANCOUVER

The B.C. Centre held three meetings in 1968, the 3rd, 4th and 5th since the centre was formed.

On March 25th, Dr. W.J. Maunder of the Geography Department, University of Victoria addressed some 20 members. His talk was titled "Weather Forecasting, Balancing Scientific Inquiry with the Value of the Product". In it, he stated that improved forecast accuracy should not be our only, or even primary, goal and suggested we consider such factors as the ability to communicate with the public, confusing terminology, the use made of the forecast by various consumers, and its value to the consumer.

On October 29th, Dr. C.D. Holtz of the Research and Training Division addressed the centre at the Frederic Wood Studio at U.B.C. This new location was chosen for the meeting owing to the increasing interest shown in the Society by members of the UBC faculty and students, particularly those in the Departments of Geography and Agriculture and in the Institute of Oceanography. Dr. Holtz outlined statistical studies which he had made on the growth of thunderstorms and empirical rules he had derived for forecasting maximum development and the extent of precipitation.

The last meeting of 1968 was held in the Board Room of the new airport terminal building on December 10th. Dr. Stewart of the Institute of Oceanography, UBC, was the guest speaker and his topic was the Global Atmospheric Research Program. His membership on the GARP executive made him well qualified to discuss this subject and he gave a most informative talk.

1969 has begun well with the address by Dr. King of the Ontario Agricultural College on January 20th on Micrometeorology in Agriculture, and an address by Dr. Kenneth Hare, retiring president of UBC, scheduled for February 25th.

The executive for the year consisted of:

Chairman - J.B. Wright
Vice-Chairman - W. Mackie
Sec-Treasurer - L.E. Parent

REGINA

A meeting of interested persons was held on September 5, 1968, for the purpose of organizing a local centre of the Canadian Meteorological Society. As a result of this meeting, application was made to the Society for the establishment of a local unit to be known as the Regina Centre of the Canadian Meteorological Society. The meeting elected Mr. S.J. Buckler as Chairman, and Mr. L.S. Meeres as secretary.

The application was approved at a meeting of the Council of the Society on September 12, 1968.

The first scientific meeting of this new centre was held in the Conference Room at the Regina Airport in the evening of November 28th. The main speaker of the evening was Mr. C.B. Adamson of the Research and Training Division of the Meteorological Service of Canada, whose topic was "World Weather Watch and the Global Atmospheric Research Program". Another feature of the meeting was the presentation of the Society's award to Mr. James Kennedy for the best meteorological exhibit at the Canada Wide

Science Fair, 1968, held at Vancouver in May. Mr. Kennedy's project was a prototype Meteorological Satellite, which had won first place in the senior class at the Regina Science Fair.

We are looking forward to our first full year in operation in 1969, with speakers such as Prof. K.M. King on January 23rd, and a meeting planned for May 12 with Mr. S.K. Blackwell of the Saskatchewan Water Resources Commission as guest speaker.

WINNIPEG

Executive meeting, Sept. 26, 1968 - to lay tentative plans to obtain speakers for up-coming dinner meetings.

Dinner meeting, Oct. 30, 1968 - Mr. W.I. Lowe, Project Engineer, Test Services, Teshmont Consultants, gave an interesting and informative talk on some of the problems of transmission lines, particularly those caused by wind. Mr. Lowe is currently engaged in the design of the Nelson River Power Line.

Lecture meeting, Nov. 15, 1968 - Dr. Clifford Holtz of the Research and Training Division, Meteorological Branch, Dept. of Transport, gave a talk on "The Growth and Decay of a Thunderstorm."

Dinner meeting, Dec. 3, 1968 - Mr. C.B. Adamson of the Research and Training Division, Meteorological Branch, Dept. of Transport, gave a talk on "The Global Atmospheric Research Project of the World Weather Watch" (CARP) and outlined some of its implications for Canada.

Dinner meeting, Jan. 24, 1969 - Dr. K.M. King, Agrometeorologist, University of Guelph, spoke on "Applications of Micrometeorology in Agriculture". Because of the nature of the talk, an invitation to the meeting was extended to the agricultural community through the Agricultural Institute of Canada.

General meeting, March 7, 1969 - The future of the Society was discussed. The final recommendations were then to be forwarded to the national executive. Plans for a display to be held in the Winnipeg air terminal were discussed. The display was set up to commemorate World Meteorological Day, March 23rd. At the end of the meeting, Mr. H. Fraser, meteorologist at the Prairie Weather Central, spoke on "Wind Profile Measurements" near Stonewall, Manitoba. These measurements are being made in tests for the Nelson River Power Line design.

At least two more meetings are being planned this spring. Tentative plans have been made for a social meeting early in May. This will probably take the form of a dinner and dance. Mr. H. Ferguson of the Climatology Division, Meteorological Branch, Dept. of Transport, has indicated that he will address a dinner meeting on May 20, 1969. He will speak on Satellites and Hydrometeorology. We are planning to hold our annual meeting in conjunction with Mr. Ferguson's address.

TORONTO

Six Executive Meetings were held during the year. Members of the Executive were:

1967-68

G.A. McKay
H. Gerger
D.M. Sparrow
W.D. Lawrynuik

Chairman
Program Secretary
Treasurer
Secretary

1968-69

R. Lee
K.T. McLeod
B.F. Findlay
H.L. Ferguson

The current 1968-69 executive, elected in May, 1968, have developed the 1968-69 program around the theme of "Applications of Meteorology to our Environment".

Seven regular meetings of the Toronto Centre were held during 1968, as follows:

- Jan. 30, 1968 - "Laboratory Measurement of Ozone of Atmospheric Interest": Dr. H.I. Schiff, Dean of Science, York University.
- Mar. 19, 1968 - "Solar Radiation as a Meteorological Parameter - Some Problems of Its Measurement": Dr. R.M. Marchgraber, Atmospheric Science Laboratory, Electronic Command, U.S. Army.
- Apr. 25, 1968 - Second Annual Dinner Meeting of the Toronto Centre. Mr. W. T. O'Dea, Director-General of the Centennial Centre of Science and Technology described the planned operation of the Centennial Centre.
- May 14, 1968 - "The Air Weather Service Today": Dr. R.D. Fletcher, Director of Aerospace Sciences, USAF Air Weather Service.
- Oct. 22, 1968 - "Hail Suppression in the USSR": Mr. J.D. Holland, Research and Training Division, Meteorological Branch, Dept. of Transport.
- Nov. 26, 1968 - "The Aims and Practice of Geographical Climatology": Professor B.J. Garnier, Dept. of Geography, McGill University.
- Dec. 10, 1968 - Dinner Meeting and tour of meteorological facilities at Toronto International Airport, led by T.L. Wiacek and C.I. Taggart.

The Dinner Meeting on April 25 was held in the Oak Room of Union Station. The Dinner Meeting of December 10 was held at the Constellation Hotel. Both these events were judged to be very successful. As in the past, regular meetings were held at 147 Davenport Road, using the facilities of the Training Section, Research and Training Division.

Toward the end of the year, preparations were being made by the Toronto Centre Executive to assist with arrangements for the Annual CMS Congress to be held in Toronto, May 27-29, 1969.

OTTAWA

The Ottawa Centre had an extremely interesting program during the past year, not only in content but also in manner of presentation.

In October, 1968, a panel discussion on "Water Pollution" was held with Prof. P.E. Uren as moderator. Panel members included Dr. H. Hurtig, C.D.A.; Mr. J. Millett, E.M.R.; Dr. R. Nelson, M.D.; Mr. T.L. Richards, D.O.T.; and Dr. E.R. Tinney, E.M.R.

In December, 1968, the centre sponsored a dinner and popular science lecture which highlighted guest speaker Prof. W. Hitschfeld and his topic "Hail and Friends, in the Caucasus". This type of meeting was most enthusiastically received and undoubtedly will be repeated for future meetings.

Three guest speakers were programmed for the January, February and March '69 meetings, and were as follows:

Mr. D.W. Boyd, N.R.C. - Brussels, Buildings and Climate
Dr. J.L. Sullivan, N.H.W. - Air Pollution
Dr. K.M. King, U. of Guelph - Applications of Micrometeorology
in Agriculture

Despite a concerted effort on the part of the executive to have an interesting and varied program, the attendance at the centre's meetings is still a problem. It is expected that the meetings in the 1969-70 session will follow through on a similar variation of presentation in order to stimulate participation.

All meetings were held at Carleton University on the invitation of the Geography Department. The facilities provided were both excellent and extensive, our sincere thanks is extended to the University.

Executive: Chairman D.J. Wright
Vice-President R.F. Taylor
Sec-Treasurer M.S. Webb

MONTREAL

<u>Officers of the Centre:</u>	68-69	69-70
Chairman	P.E. Merilees	Dr. K.L.S. Gunn
Secretary	S. Woronko	R. Shaw
Treasurer	R. Asselin	B. Barge
Member-of-the-Executive	M. Kwizak	Dr. P.E. Merilees

Meetings of the season:

Oct. 16, 1968	Dr. Andre Robert Meteorological Service of Canada	Report on recent meteorological experiments with the spectral method.
Nov. 19, 1968	Dr. G. Vali, Macdonald College, McGill University	Cloud glaciation by freezing nuclei.
Dec. 17, 1968	Rev. C. East, S.J., PhD. University of Montreal.	Observations de la temperature et de la concentration du SO ₂ au dessus de Montreal.
Jan. 28, 1969	Dr. J. Brown National Meteorological Centre	Hydrodynamic instability of the quasi-geostrophic atmosphere.
Feb. 26, 1969	Dr. M. Garstang, Florida State University.	The Barbados experiment.
Mar. 12, 1969	Dr. K. King, University of Guelph	Applications of micro-meteorology in Agriculture.

HALIFAX

In 1968, three meetings of the Halifax Centre, CMS, were held, with an average attendance of ten members. On February 13th the speaker was Mr. D.E. McClelland of the extended forecast division of the Central Analysis Office. On October 18th the speaker was Mr. R.V. Tyner of the Atlantic Weather Central. And on October 31st the speaker was Dr. R.E. Munn of the Research Section, Meteorological Branch Headquarters.

As of December 31st, 1968, the chairman was LCDR D. Nowell, who succeeded Mr. Tyner on October 18th. The secretary, D.W. Layton, continued in the position from previous years. On Oct. 18th, the secretary was appointed as the Centre's representative on the National membership committee.

QUEBEC

LA SOCIÉTÉ MÉTÉOROLOGIQUE DU CANADA CENTRE DE QUEBEC

RAPPORT DES ACTIVITÉS DE LA SAISON 1968-1969

La Société de Météorologie de Québec a été reconnue officiellement par le Conseil de la Société Météorologique du Canada le 19 décembre 1968 comme Centre de Québec de la Société Météorologique du Canada. Cette importante décision marque le point de départ d'un nouvel essor envers la météorologie dans la région de Québec, essor dont bénéficieront à la fois la Société Météorologique du Canada et le Centre de Québec.

Jusqu'à maintenant, le Centre de Québec a fait cette saison trois réunions d'information et une quatrième réunion est prévue pour le 27 mars (1969). Les conférenciers furent par ordre chronologique:

- 20 novembre 1968: M. Gordon A. McKay, directeur de la recherche à la Division de la Climatologie du Service Météorologique canadien. "Les précipitations verglacantes et le givrage".
- 6 mars 1969: M. Georges Girard, hydrologue, directeur de recherches à l'O.R.S.T.O.M. "Les bilans hydriques comparés d'un lac et de son bassin versant".
- 13 mars 1969: Dr. Kenneth M. King, professeur à l'université de Guelph. "Applications of Micrometeorology in Agriculture".
- 27 mars 1969: R. Rémy Durand, maître de recherches au Centre national de Recherches Agronomiques à Versailles. "Orientation des travaux à la Station de Bioclimatologie de Versailles".

En outre, le 20 novembre 1968, la Société de Météorologie de Québec faisait une assemblée générale spéciale pour modifier légèrement sa constitution et la rendre conforme à celle de la Société Météorologique du Canada, en vue de devenir Centre de Québec. En avril 1969, il y aura une assemblée générale annuelle pour choisir un nouveau conseil d'administration.

Le présent conseil d'administration se compose comme suit:

Président: Dr. L.-J. O'Grady
Vice-Président: R. Naud
Sec.-trés.: M. Ferland
Conseillers: R. Charbonneau,
J.-P. Fortin,
J.-G. Fréchette,
R. Perrier,
C. Wilson

D'après un accord conclu avec la Société canadienne, le président et le secrétaire doivent être membres de la Société Météorologique du Canada. Sous l'instigation du Centre de Québec, l'université Laval a donné cette année un cours d'un semestre en instruments météorologiques. La Société de Météorologie de Québec compte cette année 22 membres.

CANADIAN METEOROLOGICAL SOCIETY

PROPOSED BUDGET FOR 1970

Receipts

Dividends and Interest	\$ 100.00
Meteorological Branch Grant	1,000.00

Fees

Members 500 @ \$7.50	\$ 3,750.00	
Students - post graduate 50 @ \$4.00	200.00	
Students - undergraduate 20 @ \$1.00	<u>20.00</u>	
		<u>3,970.00</u>
		<u>\$5,070.00</u>

Expenditures

Net Atmosphere Cost		\$3,300.00
Annual Congress		
Typing	\$ 40.00	
Mailing	60.00	
Printing	<u>550.00</u>	
		\$ 650.00
Awards and Prizes		\$ 100.00
Grants to Centres		315.00
Auditor Honorarium		30.00
Executive Costs of Operation		
Bank Charges	\$ 25.00	
Postage	300.00	
Stationary	100.00	
Printing	100.00	
Secretarial Help	<u>150.00</u>	
		\$ 675.00
		<u>\$5,070.00</u>

Meteorologists

A Researcher is required to study the dispersion characteristics of plumes from coal-fired generating stations. Additional and related duties will include providing technical assistance in making air pollution surveys and maintaining an informative and co-operative liaison with governmental and industrial agencies as well as other Hydro personnel involved in the pollution area.

Preferred applicants will have a university degree in meteorology or an honours degree in mathematics and physics plus intensive study of meteorology at a recognized institution. Previous experience in the application of meteorology to the study of air pollution would be most appropriate.

An Applied Meteorologist is required to work with meteorologists and engineers on studies in the fields of hydrometeorology, air pollution control, water resource management and load-weather relationships as these involve the operations of a large electrical utility. Other duties include preparing specialized daily forecasts and climatic data for the utility.

Formal qualifications are as described under Researcher. The ability to communicate effectively and well with others is important. Forecasting and/or research experience is desirable. A knowledge of statistics and computer programming would be an asset.

Write giving full details of qualifications, experience and salary expected to:

Employment Officer
Professional and Management Staff
ONTARIO HYDRO
620 University Avenue, Toronto 101, Ontario

