CANADIAN METEOROLOGICAL SOCIETY

FIRST

ANNUAL

CONGRESS

1967

1ST ANNUAL CONGRESS OF THE CANADIAN METEOROLOGICAL SOCIETY

Carleton University, Ottawa

May 24-26, 1967

P R O G R A M M E

All sessions will be held in the Alumni Theatre B, Southam Hall, with the exception of Session 4B which will be held in Room 509, Southam Hall.

23 May	1:00 p.m.	Registration begins in H.M. Tory Building
24 May	9:00 a.m.	Session 1 - Cloud and Precipitation Physics
	1:45 p.m.	Session 2 - Dynamic Meteorology
25 May	9:00 a.m.	Session 3 - Applied Meteorology and Climatology
	1:00 p.m.	1st Annual Meeting
	3:30 p.m.	Buses leave for Gatineau Hills
	6:00 p.m.	Annual Dinner, Patterson Prize Presentation, Presidential Address
26 May	9:00 a.m.	Session 4 - Upper Atmosphere and Meteorology Today
		The session will divide at 10:00 a.m. into Sessions 4A and 4B. Session 4B - Winds and Turbulence
	2:00 p.m.	Session 5 - Meteorology and the Future

1ST ANNUAL CONGRESS

OF THE

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PROGRAMME

SESSION ONE

May 24, 1967, 9:00 a.m.
Alumni Theatre B, Southam Hall

CLOUD AND PRECIPITATION PHYSICS

Chairman: Prof. Roland List, University of Toronto

Advances in Cloud and Precipitation Physics. Survey Paper. Roland List, University of Toronto.

1. Generation of Precipitation Aloft in a Summer Thunderstorm. Clifford D. Holtz, McGill University.

2. Optical Attenuation by Falling Snow. Charles Warner and K.L.S. Gunn, McGill University.

3. Radar-Derived Snow Distributions. Paul Carlson, McGill University.

4. Feedback Mechanisms of Hailstones Growing in Convective Clouds. P.I. Buttuls, University of Toronto.

5. Measurements on the Effect of Surface Roughness on the Heat and Mass Transfer of Spherical Hailstones. P.H. Schuepp, University of Toronto.

6. 500 kc/sec. Sferics Studies of Storms Near London, Ontario. Rama C. Murty, University of Western Ontario.

SESSION TWO

May 24, 1967, 1:45 p.m.
Alumni Theatre B, Southam Hall

DYNAMIC METEOROLOGY

Chairman: Dr. André Robert, Meteorological Branch

A Survey of N.W.P. Activities in Canada. Survey Paper. André Robert, Meteorological Branch.

7. A Spectral Baroclinic Model. Philip Shields, McGill University.

8. The Incorporation of the Effects of the Release of Latent Heat into the C.A.O. Baroclinic Model. David Davies, Meteorological Branch.

9. Calculations of Structure, Phase Velocity and Growth-Rate for Waves in a Baroclinic Westerly Current. T.J.G. Henry, Meteorological Branch.

10. Certain Convective Processes Along the Strong Jet-Streams of Westerlies in the Upper Atmosphere. M. Shabbar, Meteorological Branch.

11. Mathematical and Synoptic Aspects of a Small-Scale Wave Disturbance Over the Lower Great Lakes Area. Howard L. Ferguson, Meteorological Branch.

SESSION THREE

May 25, 1967, 9:00 a.m.
Alumni Theatre B, Southam Hall

APPLIED METEOROLOGY AND CLIMATOLOGY

Chairman: C.M. Penner, Meteorological Branch

The Scientific Basis of Weather Forecasting. Survey Paper. C.M. Penner, Meteorological Branch.

12. A Satellite Cloud Photo-Interpretation Key. Roy Lee and C.I. Taggart, Meteorological Branch.

13. Objective Temperature Prediction. N. Yacowar, Meteorological Branch.

14. Evaporation on the Canadian Prairies. E. Vowinckel, McGill University.

15. Anomalies in the Climate of Alberta. R.W. Longley, University of Alberta.

16. Using a Computer to Estimate Normals of Temperature and Derived Variables for any Point on the Great Plains. G.D.V. Williams, Department of Agriculture (seconded from Meteorological Branch).

1ST ANNUAL MEETING

OF THE

CANADIAN METEOROLOGICAL SOCIETY

May 25, 1967, 1:00 p.m.
Alumni Theatre B, Southam Hall

SESSION FOUR

May 26, 1967, 9:00 a.m.
Alumni Theatre B, Southam Hall

The Upper Atmosphere and Meteorology Today - Survey Paper,
A.D. Christie, Meteorological Branch

Session Four "A"

THE UPPER ATMOSPHERE

Chairman: Dr. Alistair D. Christie, Meteorological Branch

17. A Stratospheric General Circulation Experiment. R.A.D. Byron-Scott (presented by B.W. Boville) McGill University.

18. Objective Tropopause Analysis. W.S. Creswick, Meteorological Branch.

19. Solar Variations and Their Effects on the High Atmosphere. J.B. Gregory, Institute of Space and Atmospheric Studies, University of Saskatchewan.

20. A Possible Method to Determine Atmospheric-Ozone Concentrations Above 35 km. E.J. Llewellyn, W.F.J. Evans, H. Wood, A. Vallance Jones, Institute of Space and Atmospheric Studies, University of Saskatchewan.

21. A Theoretical Study of Tides in the Upper Atmosphere. David Nunn, McGill University.

22. New Ground-Based Techniques for Investigation of the Total Amount and Distribution of Ozone. D.I. Wardle, University of Toronto.

Session Four "B"

Room 509, Southam Hall

WINDS AND TURBULENCE

Chairman: Prof. D. Hay, University of Western Ontario

23. Local Stratification in the Lower Troposphere. D.R. Hay, University of Western Ontario.

24. Kananaskis Valley Winds in Summer. L.B. MacHattie, Department of Forestry and Rural Development (seconded from Meteorological Branch).

25. Turbulence Statistics at WNRE, Pinawa, Manitoba. R.E. Munn, Meteorological Branch, and A. Reimer, Atomic Energy Commission Limited.

26. Some Measurements of Mountain Waves and Mountain Wave Turbulence Made From an Instrumented Jet Aircraft. G.K. Mather, National Aeronautical Establishment.

27. An Analysis of the Accuracies of Wind Observations Obtained From Rawinsonde Data. E.G. Morrissey and F.B. Muller, Meteorological Branch.

SESSION FIVE

May 26, 1967, 2:00 p.m.
Alumni Theatre B, Southam Hall

METEOROLOGY AND THE FUTURE

Chairman: Prof. A.W. Brewer, University of Toronto

World Weather Watch. Invited Paper. J.R.H. Noble, Director, Meteorological Branch.

28. Adjustments to the Weather - Choice or Chance. W.J. Maunder and W.R.D. Sewell, University of Victoria.

General Discussion of Topic

A B S T R A C T S

1 GENERATION OF PRECIPITATION ALOFT IN A SUMMER THUNDERSTORM

Clifford D. Holtz

The records from the McGill Weather Radar (CPS-9) in its CAPPI mode of operation has been used for an intensive study of one summer thunderstorm. The rain was observed to fall out of the storm at a rate that was proportional to the total amount of precipitation aloft. Most of the precipitation was produced in only one hour even though the total duration of the storm was twelve hours. A model, based on the concept of water storage in the form of cloud and then its conversion to precipitation, was formulated to depict quantitatively parameters such as the generation rate and the amount of precipitation aloft. This generation rate in the model, derived from coalescence theory, is proportional to the product of the total amounts of cloud and precipitation aloft. It is suggested that the observed pattern of the precipitation formation is controlled by the coalescence process rather than by variable rates of cloud production. At all times during this storm, there was a height of maximum concentration which suddenly jumped from 17,000 to 30,000 ft when the conversion rate from cloud to precipitation attained its greatest value.

2 OPTICAL ATTENUATION BY FALLING SNOW

Charles Warner and K.L.S. Gunn

An optical link over a 70-metre path on the McGill campus has been used to measure the attenuation by falling snow during the 1966-67 season. A comparison of the attenuation with the rate of snowfall at the ground measured by a heated tipping-bucket gauge has been made for the major storms comprising 100 mmw (millimeters of melted snow). The optical link provides better resolution and greater reliability at low snowfall rates than is possible with the heated surface gauge.

The record of the transmissometer at Montreal Airport agrees well with the record of our optical link. Indeed the transmissometer could be used to measure snowfall rates up to 3 mmw hr^{-1} with its present 200-metre path length.

3 RADAR-DERIVED SNOW DISTRIBUTIONS

Paul Carlson

A routine program for scanning the space around a radar makes it possible to derive useful seasonal statistics on the distribution of precipitation aloft with height and intensity. The first such distribution

for snow based on 75 hours of records in one winter is now available and shows the duration of snow of all intensities falling off increasingly rapidly with height. The strongest gradient is more than a factor 10 in five thousand feet.

Radar-estimated snowfall amounts have been compared with data from climatological stations. Over most of the area within 50-miles range, the radar-estimated snowfalls are within ± 25% of the observed values. Proceeding in range beyond 50 miles, the radar progressively underestimates snowfall amounts.

4 FEEDBACK MECHANISMS OF HAILSTONES GROWING IN CONVECTIVE CLOUDS

P.I. Buttuls

Calculations on the growth of hailstones in a model cloud show the importance of feedback mechanisms such as the depletion of the free water content caused by the growing particles, and the warming of the updraft air due to release of latent heat.

5 MEASUREMENTS ON THE EFFECT OF SURFACE ROUGHNESS ON THE HEAT AND MASS TRANSFER OF SPHERICAL HAILSTONES

P.H. Schuepp

Experimental studies in a liquid tunnel have shown that the heat and mass transfer rates of spherical particles can be increased by up to 150% by surface roughnesses such as may be found with growing hailstones. This is of particular importance because calculations on their heat and mass transfer so far always assumed a smooth spherical shape and no experimental evidence on the roughness effect was available.

6 500 KC/SEC SFERICS STUDIES OF STORMS NEAR LONDON, ONTARIO

Rama C. Murty

During the summer of 1966 a TSM/C Omi-directional monitor was installed in London to study thunderstorm and lightning activity at a frequency of 500 kc/sec. Preliminary results and future possibilities of this method will be discussed.

7 A SPECTRAL BAROCLINIC MODEL

Philip Shields

The equations governing a 2-level baroclinic general circulation model with radiative heating, surface friction, and diffusion are transformed into the spectral domain of a highly truncated double Fourier

series, as suggested by Lorenz (1960). The six non-linear differential equations which result from the transformation are integrated numerically using a fourth order Runge-Kutta integration scheme. The dynamics and energetics of the model are investigated from the point of view of heat and momentum transports, barotropic and baroclinic activity, and the effects of surface friction and diffusion using a steady-state and perturbation analysis, time integrations, and an energy budget study. In this way the period of baroclinic activity is found to be longer than that of barotropic activity; and friction and diffusion appear to have a marked effect on both. The magnitudes and directions of the energy transformations are generally consistent with other energy budget studies, but are modified somewhat because of the highly truncated wave spectrum.

8 THE INCORPORATION OF THE EFFECTS OF THE RELEASE OF LATENT HEAT INTO THE C.A.O. BAROCLINIC MODEL

David Davies

The effects of the release of latent heat have been incorporated into the C.A.O. Baroclinic Model by linking it up with a previously-developed three-layer precipitation scheme. Because of the use of the potential vorticity equation, the vertical motions for any particular time-step can only be computed from the thermodynamic equation after first solving for the stream function tendencies. As the amount of latent heat released depends on the precipitation, which in turn depends on the vertical motion, it can only be computed at the end of a time-step. But as the latent heat feedback term is needed in the potential vorticity equation at the beginning of a time step, this means that one-hour history values have to be used instead of current values.

Height and precipitation forecasts with latent heat feedback are compared with the corresponding forecasts without latent heat feedback. The effects of including empirical small scale effects are also investigated. Finally, the results of a series of test cases are statistically assessed.

9 CALCULATIONS OF STRUCTURE, PHASE VELOCITY AND GROWTH-RATE FOR WAVES IN A BAROCLINIC WESTERLY CURRENT

T.J.G. Henry

A numerical method is described for calculating phase velocity, growth-rate and vertical structure for small perturbations of synoptic scale in a zonal current, without lateral shear, which increases monotonically from 1000 mb up to the base of a barotropic and isothermal stratosphere. The method appears to be generally successful, provided the vertical shear of the tropospheric current is not too weak and the effective wavelength is not shorter than about 2000 km. Success depends upon a suitable choice of starting approximations for the real and imaginary parts of the phase velocity.

The perturbation equations are solved by finite-difference methods, using pressure as vertical coordinate. Sample calculations are given to illustrate the dependence of wave structure, phase velocity and growth-rate on wave-length and vertical shear.

10. CERTAIN CONVECTIVE PROCESSES ALONG THE STRONG JET-STREAMS OF WESTERLIES IN THE UPPER ATMOSPHERE

M. Shabbar

Previous studies of barotropic and baroclinic instability are too restrictive for direct application to the atmosphere. The atmospheric westerlies possess both, so that there is both available potential and available kinetic energy present which can be exchanged with perturbations. Here a combination of both theories for an incompressible quasi-Boussinesq fluid is presented and it is shown that any disturbance is unstable whose aspect ratio (i.e., the ratio of its wave number in the transverse direction to that in the vertical direction) is smaller than $\left|\frac{f\lambda}{g\beta}\right|$ and for which $Ri < \frac{f}{f - U_y}$. Disturbances of this type would exhibit long-rolls in a vertical transverse plane and it is shown that they can be produced by a horizontal temperature contrast in the upper part of a strong westerly Jet-stream.

A necessary and sufficient condition for the instability has been derived. It has also been shown that under the assumption of incompressible quasi-Boussinesq flow unstable cyclone-scale motions are also possible.

11 MATHEMATICAL AND SYNOPTIC ASPECTS OF A SMALL/SCALE WAVE DISTURBANCE OVER THE LOWER GREAT LAKES AREA

Howard L. Ferguson

A squall-line which crossed the lower Great Lakes area on March 13, 1963, is described. Characteristics of the squall-line are compared to typical features of such phenomena deduced in other studies. The instability line was unusual in terms of the associated surface weather. It extended for a considerable distance over a low-level Arctic frontal zone and had a propagation speed and length-of-life in excess of typical values. The disturbance was found to conform closely to the equations developed by Goldie (1925) for internal gravity waves of a somewhat smaller scale. Favourable conditions for the development of such wave phenomena are discussed briefly, together with their possible implications in synoptic-scale analysis and forecasting.

12 A SATELLITE CLOUD PHOTO-INTERPRETATION KEY

Roy Lee and Charles I. Taggart

The availability of good quality satellite pictures by automatic picture transmission makes it possible for operational forecasters to obtain a knowledge of the cloud types and distribution within his area of interest. To obtain the maximum amount of useful information requires a change in perspective, a knowledge of what clouds look like from satellite altitudes, a systematic approach to cloud photo-interpretation, and experience.

A satellite cloud catalogue using ESSA and NIMBUS APT pictures is in preparation, which includes a summary of the characteristic appearance of the different cloud types as seen from satellite altitudes together with a systematic approach to cloud photo-interpretation which we trust will materially help forecasters in Canada to acquire very quickly a facility for using APT pictures for analysis and prediction.

13 OBJECTIVE TEMPERATURE PREDICTION

N. Yacowar

As prediction models are meeting with increasing success, similar benefits will be carried over to secondary fields such as vertical motion, precipitation and temperature forecasting.

Multiple regression equations have been developed to predict maximum and minimum temperatures at selected stations in Western Canada. The group of possible predictors was chosen from sets of upper level grid point values which numerical weather prediction methods have shown can be successfully anticipated. Predictors are chosen through successive screening of 850 and 500 mb values of thickness and temperature anomalies, wind directions and vorticity, thermal and vorticity advection, gradients, snow cover, surface anomalies of temperature as well as time and space lags of the above.

Limited testing on independent data suggests that the developed equations are stable and useful.

Extension of the project to develop suitable regression equations for other regions is planned.

14 EVAPORATION ON THE CANADIAN PRAIRIES

E. Vowinckel

Evaporation has been obtained by studying the water budget (precipitation, run-off and ground water storage change) for an area of Canada from the Rocky Mountains into Quebec. The period chosen was October 1960 to September 1965.

Precipitation maps were constructed, after a special investigation of methods for the augmentation of available station records. Run-off data were, in several regions, available for a greater number of catchment areas than could be used, due to the uncertainties in precipitation distribution. Mean rainfall amounts of the various catchment areas were taken, for individual seasons, from the rainfall maps.

The ground water storage change was assumed to be zero over the five-year period examined. The validity of this assumption was tested in catchment areas with large water bodies. It seems that the error introduced by omitting this term will be less than 10 per cent of calculated evaporation. Since evaporation depends on temperature and slope of the ground, these two parameters were also evaluated, the latter by studying topographic maps.

Evaporation and run-off maps were constructed, covering the area from Alberta to Quebec, based on the catchment values. The relationship between precipitation and evaporation was studied. Mean features are discussed of the distributions of evaporation, precipitation and run-off. The various factors are examined which influence the evaporation. A plot of observed versus calculated evaporation values indicates that the method used is accurate to within $\pm$ 10 per cent, and much better for many catchment areas.

Evaporation shows much less variation over the area than does precipitation. The highest evaporation is found in the foothills of the Rocky Mountains. The slope effect is different from elevation effect. The former influences evaporation, the latter effects precipitation. The local distributions of the two elements are therefore quite different. The slope factor is also found to have an essential influence on the run-off pattern.

It is concluded that the bulk of the precipitation given up by the atmosphere is regained by evaporation in the same area. An area with run-off represents an energy source region for the atmosphere, due to release of latent heat. The critical element in obtaining evaporation values is an accurate determination of precipitation, and the present limited knowledge of this factor inhibits the calculation of evaporation.

15 ANOMALIES IN THE CLIMATE OF ALBERTA

Richmond W. Longley

This report gives some results of investigations into the small scale variations of the climate of Alberta.

A marked increase in the length of frost-free period in central and northern Alberta has arisen because of an increase in spring and fall minimum temperatures.

The heating and cooling effects of Lesser Slave Lake are apparent not only in temperature but also in the annual variation in wind

speed at Wagner.

The frequency of occurrence of winter chinooks (maximum temperature over 39°F) is abnormally high at Three Hills, Hillsdown and Alix in comparison with the frequency of surrounding stations.

Early morning traverses in the summer of 1966 along a 60-mile route near Rimbey showed temperature ranges of 15 - 20°F.

The urban effects of Edmonton are apparent in the wind roses of the neighbouring meteorological stations: Edmonton International, Edmonton Industrial, Edmonton Namao, Ellerslie, and University of Alberta.

Light winds at the Calgary airport have a diurnal variation which does not seem to be related to the topography.

The Loss/Risk ratio of hail in the Drumheller-Calgary-Olds triangle is related slightly to the precipitation in the area.

The effects of a chinook include the rapid warming of the upper 50 cm of soil even though the snow cover above the soil remains over a foot.

16 USING A COMPUTER TO ESTIMATE NORMALS OF TEMPERATURE AND DERIVED VARIABLES FOR ANY POINT ON THE GREAT PLAINS

G.D.V. Williams

A system to use latitude, longitude and elevation to estimate normals of temperature and temperature-dependent variables for any location on the Canadian Great Plains is described. Trivariate quadratic regression formulas provided by Dr. J.W. Hopkins of the National Research Council in Ottawa and based on normals for 206 climatological stations are employed in estimating the temperature normals. Methods adapted from other authors are then used to estimate normals of derived variables such as degree days. Examples are given for certain stations and results are compared with normals published for the 1931-60 period. The majority of temperature estimates are within one or two degrees F of the published normals. Computer programs are available for preparing the estimates using either the IBM 1620 or the IBM 360/65. Current research to incorporate expanded regression models and to provide for the estimation of normals of a combined temperature-photoperiod unit for agricultural applications is discussed.

17 A STRATOSPHERIC GENERAL CIRCULATION EXPERIMENT

R.A.D. Byron-Scott
(Presentation by B.W. Boville)

A three-level numerical model of the stratosphere is formulated to yield predictions based on the thermodynamic and ozone equations. These latter include long- and short- wave radiation and photochemical ozone production together with eddy diffusion and three-dimensional (geostrophic) advection, the vertical velocity being derived from a quasi-stationary vorticity equation. The model is bounded and forced from below by continuous specification of 70 - mb heights and 163 1/3 - mb temperatures.

Time integrations with moderate, intense and negligible forcing show that: the radiative-photochemical equilibrium state is 'unnatural', planetary waves are important transporters of heat and ozone, high-latitude warmings do occur and their intensity depends upon the forcing, and 'in situ' warming is mainly due to subsidence.

The model results are also compared to the harmonic analysis of observed data.

18 OBJECTIVE TROPOPAUSE ANALYSIS

W.S. Creswick

Some problems of tropopause analysis are discussed, including the subtropic and polar-front breaks, the Arctic tropopause, and data-poor regions. A straightforward objective analysis technique based on the WMO standard tropopause is proposed, and the results compared with those of the Eddy regression equation.

19 SOLAR VARIATIONS AND THEIR EFFECTS ON THE HIGH ATMOSPHERE

J.B. Gregory

Variations in solar output are greatest in the extreme U.V., soft x-rays, and particles. While the photo emissions affect the sunlit hemisphere at all latitudes, corpuscular radiation affects higher latitudes in a pattern controlled by the earth's magnetic field. The implications of these factors for atmospheric heating are discussed.

20 A POSSIBLE METHOD TO DETERMINE ATMOSPHERIC-OZONE CONCENTRATIONS ABOVE 35 KM

E. J. Llewellyn H. Wood
W. F. J. Evans A. Vallance Jones

Measurements of the infra-red atmospheric oxygen emission at 1.27 microns from high-altitude balloons have allowed the complete diurnal variation of the emission intensity to be observed. The results indicate that the emission is due to the photolysis of ozone by solar radiation in the Hartley absorption band $O_3^{(1A)} + h\nu \longrightarrow O_2^{(1\Delta_G)} + O^{(1D)}$.

Using this mechanism and a probable ozone distribution a series of altitude profiles have been calculated for different solar elevations. Comparisons of the calculated emission profiles with that obtained from a rocket measurement support the conclusions from the balloon-borne observations and indicate that it may be possible to determine synoptically the altitude profile for the ozone concentrations above 35 km using a simplified version of the photometer in small rockets.

21 A THEORETICAL STUDY OF TIDES IN THE UPPER ATMOSPHERE

David Nunn

The equations governing linear tidal oscillations in the earth's atmosphere are developed, using a pressure coordinate system.

Using this system the tidal equations are formulated to include molecular viscosity and thermal conductivity. The resulting sixth order differential equation issolved numerically over the domain from 100-400 km and the ionospheric reflectivities found for the dominant modes of the semidiurnal and terdiurnal tides. It is found that the S22 and S33 modes suffer appreciable reflection, of the order of 1/2, but that higher order modes have negligible reflectivities.

Using the equinoxial ozone heating functions of Butler and Small the semidiurnal and terdiurnal tides predicted by the model are presented, over the entire domain from 0-400 km.

The incorporation of ion drag into the model is also discussed in some detail.

22 NEW GROUND-BASED TECHNIQUES FOR INVESTIGATION OF THE TOTAL AMOUNT AND THE VERTICAL DISTRIBUTION OF OZONE

D.I. Wardle

A new total ozone spectrophotometer that measures stellar U.V. spectra has been built at Toronto. A prototype of this instrument has been operated successfully throughout one arctic winter. The new instrument is also suitable for observation of zenith sky during and after sunset, and can easily measure the second Umkehr effect. This should give interesting information on ozone in the upper stratosphere.

23 LOCAL STRATIFICATION IN THE LOWER TROPOSPHERE

D.R. Hay

Evidence of strong local gradients in clear-air refractivity is provided by different types of investigation. Direct probing with improved refractometers indicates changes of several N-units within a few decimeters; sensitive microwave radars observe fleeting echoes attributed to laminar inhomogeneities in air refractivity of at least a few meters in horizontal extent, but only a few centimeters in vertical thickness, being either flat or weakly concave downwards. The deformation of vertical smoke trails shows that thin layers of turbulence frequently are embedded in the laminar flow of the lower troposphere above 200 meters. A laboratory model demonstrates that these local inhomogeneities may be associated with heat-transfer plumes whose upper extremities are bent over horizontally by the wind into wave-like tails. An extension of internal gravity-wave theory suggests that stable waves of wavelength about 100 meters may cast off turbulent perturbations of the type indicated by smoke trails. The need for relating these investigations has led to an experimental field study involving joint observations in the lower troposphere with a sensitive radar and rocket-borne smoke generators, temperature sondes, and eventually refractometers. Details are presented on the special instrumentation and some of the preliminary observations.

24 KANANASKIS VALLEY WINDS IN SUMMER

L.B. MacHattie

Observations from three anemographs, in a north-south valley, were analysed on an hourly basis to exhibit the monthly mean diurnal wind patterns for July and August. It was found that,

(a) cross-valley components, and
(b) flow up and down sub-valleys

were equally or more prominent than the diurnal oscillation up and down the Kananaskis Valley.

The monthly mean diurnal patterns were compared with those for selected clear days when synoptic pressure gradient was low. They were found to be generally similar.

25 TURBULENCE STATISTICS AT WNRE, PINAWA, MANITOBA

R.E. Munn and A. Reimer

In the summer of 1965, 20-minute bi-directional vane observations were taken at heights of 30 and 200 feet at the Whiteshell Nuclear Research Establishment, Pinawa, Manitoba on 43 occasions. A few of the measurements were made during periods of strong vertical wind shear (as much as 13 mph between 20 and 200 feet) and therefore may be of interest to the aviation industry. Median values of the standard deviations of elevation and azimuth angles are given for various wind and stability classes, and some typical spectra are presented.

26 SOME MEASUREMENTS OF MOUNTAIN WAVES AND MOUNTAIN WAVE TURBULENCE MADE FROM AN INSTRUMENTED JET AIRCRAFT

G.K. Mather

The N.A.E. instrumented T-33 was flown out of Moffett Field, California during the month of February, 1967 for the purpose of investigating mountain waves and mountain wave turbulence. On one day, Feb. 14, moderate to severe wave activity and turbulence was experienced between 31 and 35 thousand feet over the Sierras around Bishop, Nevada. This horizontal cross-section of turbulence, wave motions and temperatures is presented along with the relevant synoptic weather situation. The influence of terrain features on the atmosphere at these levels is well demonstrated.

27 AN ANALYSIS OF THE ACCURACIES OF WIND OBSERVATIONS OBTAINED FROM RAWINSONDE DATA

E.G. Morrissey and F.B. Muller

Upper winds computed, at six second intervals, from rawinsonde data were subjected to spectral analysis. The spectra are used to examine the effects of several different computational techniques on the accuracy of the winds. In addition the spectra indicate the limiting resolution of this type of wind sensor.

28 ADJUSTMENTS TO THE WEATHER - CHOICE OR CHANCE

W.J. Maunder and W.R.D. Sewell

Weather and climate present mankind with a challenge: he can either accept them as given and alter his patterns of activity to accommodate them, or he can try to alter the processes which produce them.

In the first case man can either (a) do nothing, (b) reschedule activities (providing he has faith in the weather that is forecast), or (c) improve "the technology of weather protection" such as by developing

drought resistant crops, "hurricane proof" cities, or more economical air conditioning.

In the second case he can try to alter the amount or temporal distribution of particular weather elements, by altering the atmospheric circulation in relation to a small area (plant), a medium area (cloud, storm), a large area (river basin, state, urban area), or an extensive region (European or Pacific).

On the whole, adjustment has been focussed mainly on the first set of alternatives, but a number of recent scientific reports suggest that weather modification in limited areas and under certain favourable conditions is possible today, and that there are real possibilities of weather modification on a larger scale on the horizon.

As man increases his ability to "modify" present weather and climatic conditions by the several methods indicated, it becomes necessary to determine a rationale on which to select an appropriate adjustment to the weather. Each of the alternatives involves different costs, and presumably different benefits. Is it, for example, better to reschedule activities based on the forecast weather, or is it better to alter the atmospheric circulation in order that the weather and climate may be "tailor-made".

This paper examines the present state of the science and technology of weather forecasting and weather modification. It emphasises that in view of the sparse information available on the impact of weather that research on such topics as the identification of weather sensitive activities, and the development of regional input-output weather models, needs to be undertaken.

The need for research on weather impact and adjustment to the weather in Canada seems to be especially urgent, because of the assumed importance of weather-sensitive activities in the economy. With better information on these impacts, it will be possible to make more efficient decisions about such matters as how much larger the nation's weather information programs ought to be, whether weather modification and weather forecasting programs should be supported to a greater extent, and in what ways should weather modification be regulated. In addition, it should be possible to determine which adjustment to the weather is most efficient in a given area, and the areas in which adoption of particular adjustments seems most urgent.

Presenters

Attendees at the first CMOS Annual Congress – May 24-26, 1967

Prof. Roland List, University of Toronto
Clifford D. Holtz, McGill University
Charles Warner, McGill
K.L.S Gunn, McGill
Paul Carlson, McGilll
P.I. Buttuls, U of T
P. H. Schuepp, U of T
Rama C. Murty, U of Western Ontario
André Robert, Met. Service
Philip Shields, McGill
David Davies, Met. Branch
T.J.G. Henry, Met. Branch
M. Shabbar, Met. Branch
Howard L. Ferguson, Met. Branch
C.M. Penner, Met. Branch
Roy Lee, Met. Branch
C.I. Taggart, Met. Branch
N. Yacowar, Met. Branch
E. Vowinckel, McGill
R.W. Longley, Univ. of Alberta
G.D.V. Williams, Dept. of Agriculture
A.D. Christie, Met. Branch
B.W. Boville, McGill
W.S. Creswick, Met. Branch
J.B. Gregory, Univ. of Saskatchewan
E.J. Llewellyn, Univ. of Sask.
W.F.J. Evans, Univ. of Sask
H. Wood, Univ. of Sask.
A. Vallance Jones, Univ. of Sask.
David Nunn, McGill
D.I. Wardle, Univ. of Toronto
Prof. D.R. Hay, Univ. of Western Ontario
L.B. MacHattie, Met. Branch
R.E. Munn, Met. Branch
A. Reimer, A.E.C.L.
G.K. Mather, National Aeronautical Establishment
E.G. Morrissey, Met. Branch
F.B. Muller, Met. Branch
Prof. A.W. Brewer, Univ. of Toronto
J.R.H. Noble, Met. Branch
W.J. Maunder, Univ. of Victoria
W.R.D. Sewell, Univ. of Victoria

ROYAL METEOROLOGICAL SOCIETY

CANADIAN BRANCH

ANNUAL REPORT OF THE CANADIAN BRANCH

Meteorology in Canada came of age in 1966. It was the year that the Canadian Branch of the Royal Meteorological Society was formally dissolved, to be replaced on January 1, 1967 by the Canadian Meteorological Society. The already established RMS, Canadian Branch with its seven active Centres across Canada should prove to be an excellent base from which to launch the new Canadian Meteorological Society.

The Canadian Branch of the R.M.S. continued to expand during 1966. The seventh Centre was established at Ottawa, Ontario, with its first official meeting being held April 5, 1966. Further, the Branch increased its overall membership by 12.

The Seventh National Meteorological Congress of the Canadian Branch was held June 8-10, 1966 at the University of Sherbrooke, under the Chairmanship of Prof. A.W. Brewer. More than 110 members of the Society and guests attended the Sessions for which arrangements were made by Mr. G. Paulin, Local Arrangements Co-ordinator, and Dr. M.B. Danard, Program Committee Chairman. The Program Sessions covered Mesometeorology, Dynamic Meteorology and N.W.P., Atmospheric Diffusion, Physical Meteorology and Micrometeorology. The Congress was very fortunate to have Dr. G.D. Robinson, President, Royal Meteorological Society, Meteorological Office, Bracknell, England, present the Opening Address.

The twenty-sixth Annual General Meeting of the Branch was held at Sherbrooke on June 9, 1966. The Director of the Meteorological Service of Canada, Mr. J.R.H. Noble, presented Patterson Medals to Mr. J.M. Leaver and Mr. D.G. Black for outstanding contributions to meteorology in Canada. An important agenda item at this Meeting was the founding of the Canadian Meteorological Society.

The Executive Committee for the 1966-67 period is: President - Prof. A.W. Brewer, Vice-President - Mr. M.K. Thomas, Treasurer - Mr. G.W. Gee, Corresponding Secretary - Mr. H. Cameron, Recording Secretary - Mr. D.J. Bauer; Councillors at Large - Mr. J.L. Knox, Dr. J. Maybank, Dr. A.J. Robert and Prof. R.H. Magarvey; and the Chairmen of the British Columbia, Alberta, Winnipeg, Toronto, Ottawa, Montreal and Halifax Centres.

MEMBERSHIP

ROYAL METEOROLOGICAL SOCIETY, CANADIAN BRANCH

	Dec 31, 1965	Increase in 1966		Decrease in 1966				Dec 31/66
		Elected	Transfer	Decrease	Transfer	Resign	Struck Off	
Life Fellows	5							5
Fellow	397	12	3	1	1	2		408
Foreign Member	1							1
Student Member	15	3			2			16
TOTAL	418	15	3	1	3	2		430

TREASURER'S REPORT FOR THE YEAR

ENDING 31 DECEMBER 1966

Receipts		
Initiation fees	$ 27.50	
1965 fees	72.00	
1966 fees	4409.50	
1967 fees	48.00	$4,557.00
Other Income		
Bond Interest	$ 51.00	
Bank Interest	17.13	
Dividents - Bell Telephone Shares	28.20	
Profit on sale of Bell Rights	6.48	102.81
TOTAL RECEIPTS		$4,659.81
Expenditures		
Fees to Royal Met. Society	$3,668.22	
Bank Charges	8.68	
Postage	124.50	
Grants to Centres	51.60	
Travel Expenses	390.57	
Printing Atmosphere	532.10	
Misc. Expenses	40.34	
Honorarium to Auditor	25.00	$4,841.01
Bank balance - Jan. 1, 1966	$ 957.71	
Plus Receipts 1966	4,659.81	
Less Expenditures 1966	4,841.01	776.51
Balance - Bank of Montreal Acct. #100 Dec. 31, 1966	489.54	
- Canadian Imperial Bank of Commerce Current Account Dec. 31, 1966	286.97	776.51

BALANCE SHEET AS OF 31 DECEMBER 1966

ASSETS

Bank Balance as of December 31, 1966	$ 776.51
Bonds, Market Value December 31, 1966	
$1,000 Gov't of Canada - 3¾% - 1978	830.00
$ 300 Gov't of Canada - 4½% - 1983	259.50
Bell Telephone Market Value Dec. 31, 1966	
12 shares at $46.50	558.00
	$2424.01

LIABILITIES

1967 CMS fees paid in advance		$ 48.00
1966 fees - payable to RMS, London (22 unpaid members at 12.)		264.00
		$ 312.00
Surplus - 31 December 1965	$2519.71	
Deficit for year 1966	407.70	2112.01
		$2424.01

AUDITOR'S REPORT:

I have examined the records of the Canadian Branch of the Royal Meteorological Society, and am satisfied that the Treasurer's Report presents a proper statement of the Branch's financial position as at December 31, 1966.

R. D. Easto
Auditor

ROYAL METEOROLOGICAL SOCIETY

CANADIAN BRANCH

MINUTES of the 26th Annual General Meeting held at the University of Sherbrooke, P.Q. June 9, 1966

Prior to the Annual General Meeting, a luncheon at which approximately 110 persons were present, was held for Fellows and guests. The head table, consisting of the National Executive and guests, councillors and some of the chairmen of local centres, was introduced, following which, Mr. G. Paulin gave a welcoming address in French. Dr. Munn then introduced Dr. G.D. Robinson, President of the Society, who thanked the Canadian Branch for inviting him to attend the National Meteorological Congress, and expressed the hope that further visits could be arranged in the future. Dr. J. Clodman, representing the Prize Committee, then announced that Mr. W.S. Harley had been awarded the President's Prize for his paper "An Operational Method for Quantitative Precipitation Forecasting", which appeared in the Journal of Applied Meteorology, Vol. 4, No. 3. The Prize in Applied Meteorology, was awarded to Mr. E.C. Jarvis for his paper "A Grid Method for Predicting the Displacement and Central Pressure of East Coast Cyclones", which appeared in the Journal of Applied Meteorology, Vol. 4, No. 3.

Dr. Munn then introduced the Chairman of the Patterson Medal Award Committee, Mr. J.R.H. Noble, who outlined the history of the medal and named its past recipients. Mr. Noble then announced that the medal had been awarded to Mr. J.M. Leaver and Mr. D.G. Black for 1965. The luncheon adjourned at 2.00 p.m.

The Annual General Meeting convened in Room 123 in the Faculty of Commerce Building at 2.30 p.m.

Before Dr. Munn introduced the first item on the agenda, Professor W. Hitschfeld stated that the point taken by Dr. Munn about not enough time being available for the Annual General Meeting was, in effect, not initiated by Professor Hitschfeld but by Dr. J.Maybank.

1. MINUTES OF THE 25th ANNUAL GENERAL MEETING HELD ON 8 JUNE, 1965 IN VANCOUVER

Mr. M.K. Thomas proposed that the minutes be accepted as published. Seconded by Dr. R.H. Douglas. Motion CARRIED.

2. ANNUAL REPORT OF THE CANADIAN BRANCH EXECUTIVE COMMITTEE

Mr. M.K. Thomas proposed that the report be accepted. Seconded by Professor N.J. Moroz. Motion CARRIED.

TREASURER'S REPORT

The treasurer reported that the small deficit was due to depreciation of stock held by the Society. He further noted that one hundred and one members had not paid their 1966 fees. Mr. F.D. Thompson proposed that the report be accepted. Seconded by Professor R.W. Longley. Motion CARRIED.

AUDITOR

The treasurer reported that Mr. R.D. Easto had audited the books for 1965, and moved a vote of thanks and an honorarium of $25.00 for Mr. Easto. Seconded by Professor W. Hischfeld. Motion CARRIED.
The treasurer further moved that Mr. Easto be appointed as auditor for 1966. Seconded by Mr. T. Richards. Motion CARRIED.

NOMINATING COMMITTEE REPORT

The Committee, consisting of Mr. R.C. Graham (Chairman), Dr. P.W. Summers and Professor W. Hitschfeld, nominated the following for office during 1966-67:

Professor A.W. Brewer, President
Mr. M.K. Thomas, Vice President
Mr. H. Cameron, Corresponding Secretary
Mr. G.W. Gee, Treasurer
Mr. D.J. Bauer, Recording Secretary

COUNCILLORS:

Mr. J.L. Knox
Dr. J. Maybank
Dr. A.J. Robert
Prof. R.H. Magarvey

In the absence of further nominations, those nominated were elected to office.

MEMBERSHIP COMMITTEE REPORT

It was reported that membership for 1965 totalled 407, this being an increase of 32 over the previous year. Twelve new members have joined in 1966 and the prospects for additional new members looked very good.

EDITOR'S REPORT

Dr. S. Orvig commented briefly on the activities of "Atmosphere", and mentioned that more requests were constantly being received for our publication.

Dr. Orvig proposed that the report be accepted. Seconded by Professor Hitschfeld. Motion CARRIED.

3. LOCAL CENTRES

Mr. M.K. Thomas proposed that the printed reports from the Local Centres be accepted. Seconded by Mr. L.B. MacHattie. Motion CARRIED.

4. A NEW CANADIAN METEOROLOGICAL SOCIETY

Mr. E.J. Axton presented the results of the postal ballot as prepared by the National Executive. Of approximately 400 ballots that were distributed to the members, only 131 answers were received. 102 members were in favour of a new Canadian Society, and 29 members expressed disfavour of such a society. Of the 102 in favour, 78 elected to have the new society entitled "The Canadian Meteorological Society", and 24 "The Canadian Association of Atmospheric Sciences".

After a brief discussion, Professor B.W. Boville introduced the resolution "Notice of Motion" that had been printed and distributed to those present.

The "Notice of Motion" read as follows:

Be it resolved that:

(a) the Canadian Meteorological Society be founded at this meeting;
the new society to consist of the same membership as the Canadian Branch in 1966;
the new society to operate under the Constitution and By-Laws as published in the Winter 1966 issue of ATMOSPHERE (Vol. 4, No. 1), but that all action under the By-Laws be held in abeyance until January 1, 1967.

(b) the Executive Committee of the Canadian Branch petition the Council of the Royal Meteorological Society to dissolve the Canadian Branch as of December 31, 1966, and to arrange the transfer of funds held by the Canadian Branch to the Canadian Meteorological Society on that date.

Dr. Orvig seconded the Motion.
Professor Brewer then proposed an amendment to the motion to read - "the new society to consist in 1966 of the same membership and have the same officers as the Canadian Branch in 1966". Seconded by Mr. D. Boyd. After a lengthy discussion, during which Dr. Clodman, Dr. Maybank and Professors Gunn, Boville and Hitschfeld spoke at length, the amendment to the motion was voted on. Motion CARRIED.

Dr. Munn then asked Dr. Robinson to address the meeting. Dr. Robinson pointed out that the parent society looked favourably on the Canadian Branch breaking away from the Society, and hoped that reciprocal visits could be arranged between the societies of the two countries and that favourable and fruitful discussions would materialize.

A rather lengthy and sometimes detailed discussion then took place on the amended motion. When the vote finally took place, it was CARRIED 68-4.

A motion was then tabled by Dr. Andrew Thomson, which read:

"The Executive Committee expresses its gratitude to the Royal Meteorological Society for its assistance in the original formation of the Branch, its continued help through its existence, and hopes that this co-operation and colaboration will continue".

Professor Brewer seconded the motion and it was CARRIED unanimously.

A further motion was then tabled by Professor Hitschfeld, which read:

"Resolved that the Canadian Meteorological Society considers itself the successor of the Canadian Branch of the Royal Meteorological Society, and the inheritor of the many and varied activities of the Royal Meteorological Society in Canada. Resolved further that the Royal Meteorological Society be asked to recognize the Canadian Meteorological Society as the successor of the Canadian Branch".

Seconded by Dr. Maybank and CARRIED unanimously.

5. FEES - 1967

It was moved by Mr. F.D. Thompson that the 1967 fees be established as $6.00 for regular members and $1.00 for student members. Seconded by Dr. Clodman. Motion CARRIED.

After a lengthy discussion on the qualifications for student membership it was moved by Dr. Clodman and seconded by Mr. MacHattie that the subject be referred to the Executive Committee for a decision. Motion CARRIED.

ATMOSPHERE

Dr. Munn stated that Mr. J.A.W. McCulloch had accepted the office of Editor of 'Atmosphere' for the ensuing year and that Mr. E.J. Axton had accepted the office of Business-Manager. Mr. Axton then outlined varied aspects of advertising that could be incorporated into 'Atmosphere' to allay the operating costs. He then requested some indication as to the type and extent of advertising that the members would welcome.

Professor Brewer moved that the mode of advertising be left to the editorial board. Seconded by Mr. M. Kwizak. Motion CARRIED.

Dr. Munn then indicated the fields in which the editor would welcome articles.

CENTRES AND CHAPTERS

Mr. M.K. Thomas noted how well the local Centres had performed during the last year and stated that every possible assistance would be forthcoming from the National Executive in the future. However, a great deal of organizing and hard work was necessary within each centre if it was to produce an interesting and varied programme.

6. OTHER BUSINESS

Dr. Maybank stated he would like to see a permanent headquarters for the Society, similar to the one that the Canadian Astronomical Society has in Toronto. He requested that inquiries be initiated into the plans for 315 Bloor Street, West, when the Meteorological Branch move to their new headquarters. Furthermore, Dr. Maybank suggested that membership to the Canadian Meteorological Society should be made to voluntary observers, who made an outstanding contribution to the national climatological network. Their annual fees being paid by the Meteorological Branch in recognition of their services.

Dr. Robinson then outlined the procedures that the Parent Society would like to be observed if any member of the Canadian Branch wished to resign. The annual fee for Overseas Fellows would be 3 guineas.

The outgoing president, Dr. R.E. Munn, then thanked the members for their co-operation during the meeting, and the meeting was adjourned at 5.15 p.m.

E.J. Axton
Recording Secretary

ANNUAL REPORTS FROM CENTRES

Vancouver

The British Columbia Centre held four meetings during 1966 with attendance varying from 10 to 24 members and guests.

In the early spring Mr. A.W. Jackson, Meteorologist in charge of the Forestry Forecasting Unit at Vancouver, spoke on "Fire Weather and the Forest Industry". This talk was illustrated with over a hundred excellent colour slides. In April Dr. Norman Thyer, U.B.C. Meteorologist, spoke on "Valley Winds", a project that he has been studying for several years.

In the early Fall we were fortunate to have Dr. D.P. McIntyre, Chief of Research and Training Division, Toronto, passing through Vancouver on his way from a conference in Japan. His subject was "Management in the Scientific Environment" and after his talk he commented on the trip to Japan, and on the MSC A.P.T. satellite program. Late in the fall, Prof. A.W. Brewer, University of Toronto, visited us and presented a paper "Ozone in the Stratosphere". He also commented on the emerging Canadian Meteorological Society.

No change in officers took place during the year, and so the Executive remains: Chairman - Mr. S. Nikleva, Secretary-Treasurer - Mr. J.B. Wright, Member - Mr. J. Emslie.

Edmonton

Officers for the year 1966 were as follows:

	1965-66	1966-67 (elected 21 June)
Chairman	Dr. P.W. Summers	Prof. R.W. Longley
Secretary	Prof. R.W. Longley	Dr. P.W. Summers
Treasurer	Mr. C.E. Thompson	Mr. W.H. Robertson
Member at Large	Prof. I.Y. Ashwell	Mr. D. Storr

During the year 1966, six meetings of the Alberta Centre were held, four in Edmonton and two in Calgary.

17 February 1966 - At Edmonton a panel discussion was held on the problem of "Forecasting Hail in Alberta". The discussion was chaired by Dr. P.W. Summers, Research Council of Alberta. The participants were Prof. R.W. Longley, Geography Department, University of Alberta; Mr. C.E. Thompson and Mr. W.L. Sly of the Edmonton Weather Office.

15 March 1966 - Dr. P.W. Summers, Research Council of Alberta addressed a meeting in Calgary on the meteorological aspects of "Urban Air Pollution."

21 June 1966 - A brief Annual Meeting was held and the officers for 1966-67 elected. Mr. H. Cameron, Canadian Meteorological Service, then addressed the Edmonton members on "World Weather Watch".

13 September 1966 - Dr. R.W. Gloyne from the Edinburgh office of the British Meteorological Office spoke in Edmonton on Agrometeorological Services and Research in the British Isles.

7 and 10 November 1966 - The year ended with Prof. A. Brewer addressing the members first in Calgary, then in Edmonton, on "Ozone in the Stratosphere".

Winnipeg

During 1966, four meetings were held. Topics included "The Vorticity Budget of a Cold Low" by Mr. Gary Schaefer of the Winnipeg Office; "Load Dispatching and Weather" plus a film "Gasorama" by Mr. John Herman of the Winnipeg Gas Co. Ltd.; "Airstream Meteorology" by Dr. R.A. Treidl, Research and Training; "Noctilucent Clouds over Canada" by Dr. A. Christie.

Three meetings were held in the Conference Room of Administration Bldg., International Airport, while the meeting at which Dr. Treidl spoke was held in the Banquet Room.

Officers for the year were: Chairman - Mr. R. Walkden; Vice-Chairman - Mr. H. Fraser; Secretary Treasurer - Mr. F. Mahaffy.

Toronto

Six meetings were held by the Toronto Centre during 1966. The annual dinner meeting on April 21, attended by over 70 members and wives, featured an interesting preview of EXPO '67 as described by Allan Rowan-Legg, EXPO's Regional Director for Ontario. Other meetings covered a variety of technical subjects: "Progress in Agricultural Meteorology" by Dr. R.E. Lemon of Cornell University; "Hydrometeorology in the Prairie Provinces" by G.A. McKay and D. Storr; "Recent Trends in Applied Meteorology" by Dr. E.W. Hewson of Michigan University; "New Developments in Hail Research" by Dr. R. List of the University of Toronto; and a panel discussion on "Designing and Using a Meteorological Observing System" with Messrs. Clodman, Vockeroth, Muller, Wiacek and Cudbird of the Meteorological Service of Canada as principals.

Officers from 1 June 66 were: Chairman, Mr. G.L. Pincock; Secretary, Mr. H.C. Belhouse; Program Secretary, Mr. L.G. Tibbles; Treasurer, Mr. J. Rogalsky.

Ottawa

The Ottawa Centre was organized as a result of a meeting held on January 19, 1966. Mr. J.R.H. Noble, Director of the Meteorological Branch, spoke to the gathering on "The History and Growth of the Canadian Meteorological Service and Future Developments". The following officers were appointed: Chairman - Mr. G.W. Robertson; Vice-Chairman - Mr. W.E.H. Cooper; and Secretary-Treasurer - Mr. M.S. Webb.

A talk entitled "Applied Micrometeorology" was presented by Dr. R.E. Munn on April 5. Major C.I. Taggart addressed a full meeting November 28 on "TV Meteorology from 800 Miles Up".

Looking ahead, 1967 will prove, without doubt, to be a memorable year for the Ottawa Centre. It is a most happy coincidence that the first Annual Meeting of the Canadian Meteorological Society should be held in Ottawa during Canada's Centennial Year. The Ottawa Centre, the youngest member centre of the C.M.S., is both honoured and proud to be the host on this historic occasion.

Montreal

Seven meetings of the Montreal Centre were held in 1966. On January 19, Mr. C.I. Taggart of the National Research Council gave a well-illustrated talk on "Satellites and Meteorology". Later the same month, on January 31, Dr. D.P. McIntyre, Research and Training, Meteorological Branch, reviewed "Actual Trends in Canadian Meteorological Research". On March 14, Mr. G.W. Robertson, Agrometeorological Section, Department of Agriculture, reported on "Recent Developments in Agrometeorology". On April 25, Prof. Edward N. Lorenz, Massachusetts Institute of Technology, discussed "Variability and Predictability of the Atmosphere at Extended Range". The 1965-66 program concluded on June 6 with an account of "Research Activities in the British Meteorological Office" by Dr. C.D. Robinson, President of the Royal Meteorology Society. The 1966-67 program opened on October 18 when Dr. N.H. Thyer, McGill University, spoke on "Valley Winds". On November 29, Prof. A.W. Brewer, President of the Canadian Meteorological Society, addressed the Centre on "Ozone in the Stratosphere".

Officers from June 6, 1966 were: Chairman, Mr. B. O'Reilly; Secretary, Mr. D. Davies; Treasurer, Mr. V.R.K. Rao; Member, Mr. G. Paulin.

Halifax

Three meetings of the Halifax Centre, Canadian Branch, Royal Meteorological Society, were held in 1966. While attendance was not large, sufficient interest was shown to make the continuance of the centre worthwhile

and to inspire the executive to renewed efforts in 1967.

On May 11, Mr. K.D. Gardner of the Atlantic Weather Central spoke on the "Tropospheric-Stratospheric Relations" project and Mr. H.L. Ferguson of the Meteorological Headquarters, Research and Training Staff, spoke on "Meso-Scale Wave Disturbances in the Atmosphere".

On October 6, Mr. A.P. Mathus of the Halifax Automatic Picture Transmission centre spoke on "Meteorological Satellites". As a second item of business, Mr. D.W. Layton was elected to finish Mr. J.R. Hendricks' term as secretary of the Halifax Centre.

On November 3, Prof. A.W. Brewer of the Meteorology Department, University of Toronto, spoke on "The Production and Transport of Ozone in the Stratosphere". At the conclusion of his talk, Prof. Brewer answered questions on the current status of the Canadian Meteorological Society.