A DIRECTORY OF CLIMATE AND RELATED COURSES AND PERSONS INTERESTED IN CLIMATOLOGY IN ALBERTA

Compiled by

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for the

ALBERTA CLIMATOLOGICAL COMMITTEE

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NORTHERN FOREST RESEARCH CENTRE
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ENVIRONMENT CANADA
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EDMONTON, ALBERTA, CANADA
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FOREWORD

At the February 1976 meeting of the Alberta Climatological Committee it was suggested that it would be useful to prepare a list of the climate and related courses given in the postsecondary education institutions in the province, and also to compile a directory of all those persons in Alberta interested in climatology. As the response to enquiries was favorable, it was decided at our June meeting to publish the information received.

A letter was sent to all postsecondary education institutions in the province in late February requesting information on departments, courses, and staff teaching climate or closely related courses. Eleven positive responses were received and these are published in Section A of this Directory. The information is published in the following form:

1. Institution and Address
2. Department
3. Staff teaching climatology or a related course, with their research interest areas if available.
4. Courses given, with a brief calendar outline of the course.
5. Facilities and Equipment
6. Available Climatic Measurements
7. Recent Graduate Students and Theses
8. In-course Graduate Students in Spring or Summer of 1976.

To accomplish the second goal a questionnaire was prepared and sent to all persons known to have or who might have an interest in climatology. No hard definition was used of what is a climatologist or a person interested in climatology. We accepted the usual meteorological usage which equates climatology with long-term weather record keeping, the presentation and application of climatic data, and the analysis of the causes of differences of climate. We also included various other persons who have an interest in the atmospheric environment of the earth's surface and the air-energy-land-biota interactions that take place there. All together about 110 questionnaires were distributed, and 88 replies had been received by the end of October. An alphabetical list of persons returning the questionnaires is given in Section B. The responses are published as received with limited editorial changes, except a small attempt made to standardize the references included. The returns were received at various times between March and October, and therefore do not always contain the latest activities or publications of the individuals.

The information is published in the following form:

Name of Person
1. Position and Affiliation
2. Climatology Interests
3. Research Studies
4. Climatology or related courses presently taught or in 1974-75, 1975-76
5. Author's three most significant publications prior to 1969
6. Climatological publications since January 1969

The year 1969 was chosen as the date from which to list all climatological publications because an earlier bibliography, initiated under the auspices of the Alberta Climatological Committee, had listed material up to that year (Bibliography of Climatology for the Prairie Provinces 1957-1969, edited by R.W.Longley and J.M.Powell. University of Alberta Press 1971).

The directory is in no way intended as a comprehensive list of persons in Alberta interested in climatology. The Alberta Climatological Committee would be pleased to receive information from others interested in the field so that they can be informed of the work of the Committee or be included in any later editions of the directory.

John M. Powell, Compiler
October, 1976
Chairman
Alberta Climatological Committee

SECTION A. Institutions offering Climate or related courses

CALGARY

1. MOUNT ROYAL COLLEGE
   4825 Richard Road S.W., Calgary. T3E 6K6

2. Environmental Sciences

3. Staff teaching climatology:
   A.R. Thirnbeck,
   R. Langemann,
   plus sessionals

4. Courses:
   Geography 1110/2201 Introduction to the Physical Environment

An introduction to the study of the physical environment. The course familiarizes the student with the basic elements of climate and landforms. The interpretation of topographic maps and air photographs, work on climatic data and charts, supplemented by aerial and ground field trips will give the student an understanding of his local environment.

Geography 1209 Aviation Meteorology

This course will cover the meteorology requirements for the Ministry of Transport Commercial Pilots license and, in addition, will concern itself with high altitude meteorological problems. The emphasis through the course will be on the effects meteorological phenomenon have on aviation, what meteorological information is available to pilots, and the accurate interpretation and evaluation of this information.

Geography 1210 Weather and Climate

This course invloves the study of the elements of the atmosphere and includes detailed studies of the urban climate, air pollution, climatic classification and climatic change. Laboratory work includes individual student project experiments and familiarization with the operation of meteorological instruments.

5. Equipment:
   20 meter instrument tower,continuous recording of temperature and wind data, portable weather stations, plus air pollution monitoring equipment, acoustic radar and solar radiation.

CALGARY

1. SOUTHERN ALBERTA INSTITUTE OF TECHNOLOGY
   1301-16 Ave. N.W., Calgary T2M OL4

2. Chemical Engineering Technology and Engineering Science Technology

3. Staff teaching climate related courses:
R.G. Lock

4. Courses:
CHT-782 Design for Pollution Control (10 hrs. meteorology).
Applications of design principles to industrial waste in order that current environmental standards are achieved. Solid, liquid and air effluents are considered with respect to regulations, sampling, monitoring and design practice.

EST-500 Environmental Control I.-Air Pollution (5 hrs. meteorology).
Includes fundaments of air pollution control including sources and types of air pollutants, measurement, standards, health aspects, meteorological factors, and evaluation of current air pollution control methods.

5. Equipment:
Receiving unit for meteorological satellite photographs-passed onto local meteorological office. Mathematics - Physics Department (Sol Flury).

CALGARY

1. UNIVERISITY OF CALGARY
2920-24 Avenue N.W., Calgary, Alberta T2N 1N4

2. Geography Department

3. Staff teaching climatology
M.B. Giovinetto - Physical climatology, climatic change, glaciology.
L.C. Nkemdirim-Climatology, hydrology, analytical methods.

4. Courses:

Geography 305 Weather and Climate. Half course. Undergraduate level. Physical principles of meteorology and climatology. Weather development in relation to different scales of atmospheric circulation. Elements of synoptic and dynamic climatology, determination of characteristics and the distribution of climates. Laboratory work emphasizes North American examples.

Geography 405 Microclimatology. Half course. Undergraduate level. Climate near the ground, forest microclimate, agricultural climatology, urban climatology, the climatology of atmospheric pollution and the impact of the environment on climate.

Geography 415 Glaciology. Half course. Undergraduate level. Mountain and polar glaciation. Glacial meteorology. Snow and ice stratigraphy. Glacier flow. Sea-ice and its interactions with the atmosphere and oceans. Mass and energy balance of valley

glaciers and polar ice sheets. Laboratory work: analysis of samples and data collected in snow and ice fields.

Geography 515 Hydrology. Half course. Undergraduate or Graduate level. Processes governing the depletion and replenishment of the water resources of the land areas of the earth. It addresses itself to such problems as the physical processes of city and industrial water supply, irrigation projects, maximum flood expectation and adequate drainage.

Geography 505 Changes in Climate. Half course. Undergraduate or Graduate level.
Atmosphere-ocean interactions as controls of climate. Historical and pre-historical climatic change. Glacial and non-glacial climatic regimes and inferred general circulation types. Paleoclimatology within a framework of continental drift. Geological evolution of the ocean-atmosphere system. Theories of climatic change.

Geography 605 Seminar in Climatology and Hydrology. Half course. Graduate level.

Geography 705 Topics in Climatology. Half course. Graduate level.

5. Facilities and Equipment:

Climatological Station equipped for Research studies in Meteorology and Climatology. Equipment includes:

Maximum and minimum thermometers, Aspirated psychrometer, Anemometers and Anemograph, soil thermometers and recorder, hygrothermograph, dew cell and recorder, evaporation pan, lysimeter, piche atmometer, sunshine recorder, pyroheliograph and net radiometer, solarimeter with an integrating system and recorder.

Also a mobile lab housed in a trailer that has the capability of using most of the above instruments and recording data. Also a cold room for glaciological research.

The Avalanche Research Section of Environment Canada is housed in the Department of Geography. This group under Dr. R.I.Perla are carrying out avalanche research in the National Parks.

6. Available Climatic Measurements:

(a) Monthly Climatological summaries - published by the Atmospheric Environment Service - including maximum and minimum temperatures, precipitation measurements, hours of sunshine, evaporation and soil temperatures.

(b) Hourly recordings of temperature, relative humidity, wind direction and wind speed, mean sea level pressure, soil temperatures, dew point, and incoming solar radiation (pyroheliograph).

7. Recent Graduate Students and thesis:

Lunn, Gerald R. M.Sc., 1974: "A Climatological Investigation of Air Pollutants in Calgary's Urban Island." (L.C.Nkemdirim).

Weber, Lena., M.Sc., 1974: "Stochastic Precipitation Process: A Study of Runs of Precipitation Series for Alberta." (L.C.Nkemdirim).

8. In-course Graduate Students in Spring of 1976:

Danielewicz, Ben W., M.Sc., "A Mesoscale Study of the Chinook." (R.Rowe-Chem. Eng.)

Leggat, Keith R. M.Sc. "Vertical Distribution of Wind and Temperature in the Urban Atmosphere: A Case Study for Calgary." (L.C. Nkemdirim).

Truch, Peter, M.Sc., "Surface Temperature Investigations in a Large Prairie City - Calgary." (L.C. Nkemdirim).

EDMONTON

1. NORTHERN ALBERTA INSTITUTE OF TECHNOLOGY
   11762 - 106 Street, Edmonton. T5G 2R1

2. Biological Sciences Technology and Forest Technology

3. Staff teaching climatology:

   G. Ontkean (Forest Technology)
   S.V.Snyder (Bio-Science)

4. Courses:

BSE 450 Bioclimatology	45 hrs.
BSP 450 Meterology	45 hrs.

An introduction to the study of weather and the instruments used to measure changes in weather. The course is designed to provide the student with the basic understanding necessary for further studies in air pollution or field microclimate.

FT 222 Meteorology	24 hrs.

Meteorology in forestry practice.

5. Equipment:

   Weather station equipment for instructional purposes.

1. UNIVERSITY OF ALBERTA
   89 Avenue & 114 Street, Edmonton. T6G 2J8

2. Department of Geography (including Division of Meteorology)

3. Staff teaching climatology:

M.C. Brown	Microclimate, Speleoclimate
R.B. Charlton	Cloud Physics, Environmental Impact Studies
J.H. England	Climatic Change, Paleoclimate
D. Gill	Boreal Bioclimatology
K.D. Hage	Micrometeorology, Microclimatology
A.H. Laycock	Water Resources, Hydrometeorology
E.P. Lozowski	Hail, Cloud Phsyics
H.J. McPherson	Environmental Hazards
E.R. Reinelt	Synoptic Meteorology, Weather Satellites
S.I. Smith	Climatology

4. Courses:

Geography 231 Introductory Physical Geography II. Half year.
Introduction to the atmosphere and biosphere. Physical elements of weather and climate. Causes,changes and patterns of weather. Climatic classification. Spatial and dynamic interrelations of climate,soils and vegetation.

Geography 309 Intermediate Physical Geography . One year.
Climate, vegetation, soil, water and landforms with stress upon local, regional and world patterns of each.

Geography 333 Introduction to Weather. Half year.
A survey of weather processes and phenomena: radiation, temperature, moisture, winds, clouds, storms. Precipitation processes. Weather analysis and forecasting. Urban weather. Weather and modification.

Geography 334 Introduction to Climate. Half year.
A survey of climatology. Climatic classification. Climate of the continents. Some considerations of climatic changes. Interaction of climate and biosphere with emphasis on man.

Geography 336 Environment Alberta. Half year.
The physical environment of Alberta. Regional variation in the patterns of climate, landforms, water, soils, vegetation and wildlife; the geographic synthesis of these patterns to give a broad understanding and appreciation of the province and its environmental problems.

Geography 368 Hydrometeorology and Biometeorology. Half year.
The micro and regional variations in weather and climate that contribute to variation in watershed and runoff characteristics. Plant management relationships and the microclimate of plants.

Geography 433 Microclimatology. Half year.
The climate of the lowest layers of the atmosphere. The relation of microclimatology to topography, plant and animal habitat and man.

Geography 439 Environmental Hazards. Half year.
Analysis of natural hazards presented to man by his physical environment. Topics will include floods, earth dynamics, mass movements, avalanches, drought and violent storms.

Geography 465 Boreal Ecology I. Half year.
Physical environment of the boreal region: climatic processes (emphasizing winter conditions); regional physiography (especially glaciation, periglacial geomorphology, permafrost and soils); environmental modification by man.

Geography 468 The Physical Geography of Water Resources. Half year.
Local, regional and world patterns of water supply. Precipitation, evapotranspiration, streamflow, soil moisture, groundwater, and their relationships in water balance.

Geography 533 Climatology. Half year.
The concept of the "normal climate", Pleistocene climates and the research techniques for their reconstruction; postglacial and recent climatic fluctuations and the general circulation, their influence on plant life; the purpose and success of classification of climates; the concept of potential evapotranspiration; use of climatic knowledge in the service of man - application of Bioclimatology.

Geography 539 Seminar in Natural Hazards. Half year.
An examination of selected topics in natural hazards such as earthquakes, floods, hail, climatic hazards and avalanches. Discussion will center on the theoretical framework of natural hazard studies and the interaction between natural hazards and society.

Geography 568 Water Resources I. Half year.
Water supply patterns and problems, emphasizing environemental interrelationships and limitations.

Geography 569 Water Resources II. Half year.
Problem analysis approach to water management emphasizing regional variations in water demand and their implications.

Meteorology 307 General Meteorology. One year.
A systematic study of weather elements and atmospheric processes with emphasis on the underlying physical principles. Atmospheric composition, temperature, humidity, wind stabilty, cloud forms, precipitation processes, fronts and air masses,

and an introduction to the general circulation. Practical work in weather observing and elementary weather map analysis.

Twelve additional courses in meteorology at the senior undergraduate and graduate levels are offered as part of the training of professional meteorologists and climatologists. By title these courses are as follows:

Meteorology 406	Meteorological Thermodynamics and Radiation	Half year.
Meteorology 407	Dynamic Meteorology	Half year.
Meteorology 412	Synoptic Meteorology Laboratory I	Half year.
Meteorology 506	Reading and Seminar Course in Meteorology	Half year.
Meteorology 507	Seminar Course in Meteorology	One year.
Meteorology 511	Synoptic Meteorology	One year.
Meteorology 512	Synoptic Meteorology Laboratory II	Half year.
Meteorology 515	Meteorological Statistics	Half year.
Meteorology 516	Physical Meteorology	Half year.
Meteorology 517	Cloud Physics	Half year.
Meteorology 525	Atmospheric Turbulence and Diffusion	Half year.
Meteorology 526	Advanced Topics in Dynamic Meteorology	Half year.

5. Facilities and Equipment:

Climatological Station (Ellerslie University Farm) - supported jointly by the Departments of Geography and Soil Science. University Campus Weather Station (top of Henry Marshall Tory Bldg.). Weather Satellite Receiver (APT - Visual and Infra Red imagery). Cold Room for cloud physics and hail laboratory studies. Mini-Computer with Disc storage and Magnetic Tape Unit. Trailer with two 4.5 KW power plants for field studies. Plus conventional weather instruments.

6. Available climatic measurements:

Location and Elements	Abstracted	Published
Ellerslie University Farm		
Air Temperature		
Daily Maximum	X	AES[1]
Daily Minimum	X	AES
Thermograph		
Soil Temperature (Daily)		
Grass cover (5, 10, 20, 50, 100, 150, 300 cm)	X	AES
Various covers (6) (20,100 cm)	X	
Deep Soil Temperatures (Weekly)		
Grass cover (3,6,9, 15 m)	X	
Evaporation Pan		
Water Loss	X	AES
Minimum and Maximum Water Temperatures	X	AES
Pan wind speed	X	AES

Location and Elements	Abstracted	Published[1]
Wind		
Speed (2 m) - Daily	X	
Speed and Direction (10 m) - Hourly	X	AES
Solar Radiation		
Daily Total	X	
Continuous chart		
Sunshine		
Daily Total	X	AES
Precipitation		
Standard Rain Gauge	X	AES
Nipher Snow Gauge	X	AES
Tipping Bucket Rain Gauge Chart	X	
Henry Marshall Tory Building (Campus)		
Sunshine		
Daily Total	X	
Wind		
Speed and Direction - Hourly	X	
Gusts (Dines Anemograph)		

[1]Published by Atmospheric Environment Service, Environment Canada.

7. Recent Graduate Students with M.Sc. (Meteorology or Geography):

Alexander, J.D., 1975: Satellite data analysis of Arctic 500-mb lows. (E.R. Reinelt).

Angle, R.P., 1973: Airflow modification due to a change in surface roughness. (K.D. Hage).

Baldwin, R., 1975: A theoretical model for cave airflow: The chimney effect. (M.C. Brown).

Beattie, A., 1975: A photographic study of the kinematics of natural hailstones. (E.P. Lozowski).

Berry, R.L., 1973: The ageostrophic wind component over the Western Cordillera: Two case studies. (E.R. Reinelt).

Caiazza, R., 1976: Nutrient loadings in precipitation and dry deposition in the Cooking Lake Moraine area of Alberta. (K.D. Hage).

Cheng, L.H., 1975: A numerical simulation of initiation of graupel growth. (R.B. Charlton).

Hogg, W.D., 1973: Boundary-layer fluxes above a hot water plume. (K.D. Hage).

Hume, W., 1975: Development of a quasi-geostrophic prediction model for weather systems over western Canada. (E.P. Lozowski)

Kociuba, P.J., 1974: Weather map typing and applications for Alberta. (R.B. Charlton)

Lambert, S.J., 1973: A numerical model of the sea breeze. (E.P. Lozowski)

Lelievre, C., 1976: One dimensional model of the urban heat island. (K.D. Hage)

Oleskiw, M., 1976: Growth of artificial graupel. (E.P.Lozowski).

Raddatz, R., 1975: Late spring upslope weather on the Canadian Western Plains: A mesoscale numerical simulation. (K.D. Hage).

Saulesleja, A., 1976: Evaporation from Lake Wabamun, Alberta. (K.D. Hage).

Scholefield, P., 1976: Weather map typing for the Western Canadian Arctic regions. (E.R. Reinelt)

Schram, G., 1974: The influence of orography and surface friction on synoptic scale vertical motions over Western Canada. (E.R. Reinelt).

Strong, G., 1974: The objective measurement of Alberta hailfall. (E.P. Lozowski).

Vickers, G., 1975: Diffluence and cyclogenesis in the lee of the Rocky Mountains. (E.R. Reinelt).

Wight, J.B., 1973: Aspects of evaporation and evapotranspiration in the water balance of Baker Creek Basin, near Yellowknife, Northwest Territories. (A.H. Laycock)

Wilson, J., 1976. Local advection arising from a change in surface temperature. (K.D.Hage).

Wong, R., 1974: Meteorological-hydrological relationships in the Cypress Hills, Alberta - an attempt at model development for discharge forecasting. (A.H. Laycock).

8. In course graduate students, summer 1976:

Broszkowski, J.: Weather satellite data gridding. (E.R. Reinelt)

Chang, A.: Cloud distribution in the Canadian Arctic. (E.R. Reinelt)

MacIver, D.: Climatological investigations of reforested areas of Alberta. (A.H. Laycock).

McDougall, F.R.: Fast-response temperature sensor. (K.D. Hage).

Mercer, J.: Orographic modification of fronts. (E.R. Reinelt).

Morrow, T.: Time variability of hailfall. (E.P. Lozowski).

Oracheski, D.: Studies of cloud modification in air crossing the Rockies. (E.R. Reinelt).

Witters, S.: Remote sensing of snowfall distribution in the Cooking Lake moraine area. (A.H. Laycock).

Woodburn, R.: Snowmelt runoff in relation to land use and vegetation in the Cooking Lake moraine area, (A.H. Laycock)

Wrenshall, P.: The use of radar echoes to interpolate between ground hailfall measurements. (R.B. Charlton)

1. UNIVERSITY OF ALBERTA

2. Department of Forest Science

3. Staff teaching climate related courses:

P.J. Murphy	Forest Fire Behavior
K.O.Higginbotham	Physiological ecology and Tree Physiology
R.L. Rothwell	Forest hydrology

4. Courses:

Forest Science 316 Silviculture I (Forest Ecology) Half year. (Includes environmental factors and their relation to the establishment, growth, composition and quality of forest trees and stands).

Forest Science 340 Forest Fire Control and Use. Half year. (About 25% of course deals with fire weather and weather effects on forest fuels and forest fire behavior).

Forest Science 450 Forest and Range Hydrology. Half year. The role of forest and range vegetation in determining the hydrologic function of a watershed natural storage phenomena of the forest land and ways it can be modified.

Forest Science 452 Forest Watershed Management. Half year. Principles and methods in managing forest and range land to obtain optimum production and regulation of water yields while maintaining soil stability; watershed management as a component of integrated forest resources management.

5. Equipment: Rain guages (standard and recording), thermometers, hygrothemographs, actinographs, water level recorders, water quality analyzers, evaporation pan, anemometers, psychrometers, neutron probe soil moisture blocks, radiation sensors, water potential pressure chamber, infrared gas analyzer, fuel moisture scales.

6. Available climatic measurements:

   Two years precipitation, radiation, temperature, evaporation, and soil moisture measurements on the Cooking Lake moraine.

7. In-course graudate student, spring 1976:

   Ross Parker - Acid precipitation. (K.O. Higginbotham)

1. UNIVERSITY OF ALBERTA

2. Civil Engineering

3. Staff teaching climate related courses:

   J.P. Verschuren - Surface Water Hydrology

4. Courses:

   Civ E 541 Hydrology Half year
   Water occurrence in nature and its relation to hydraulic engineering; analysis of precipitation and stream flow data, precipitation-runoff relationships, groundwaters, river behaviour.

   Civ E 641 Surface Water Hydrology Half year
   Precipitation-runoff measurement and analysis, infiltration, energy-evaporation-evapotranspiration, hydrograph analysis, peak flows, flood routing, snow melt, mathematical modelling.

   Civ E 642 Statistical Methods in Hydrology Half year
   Probability, basic statistical concepts, statistical association between variables, frequency analysis, non-parametric methods, time series analysis, stochastic processes, simulation techniques.

7. Recent Graduate Students and theses:

   Meheriuk, W., 1972: The application of the theory of stochastic processes to precipitation at some Alberta stations. (J.P. Verschuren)

   Muzik, I.: State variable model of surface runoff from a laboratory catchment. (J.P. Verschuren)

8. In-course Graduate Students in spring, 1976:

   Crawford, D.: A mathematical model of the water balance of the Cooking Lake Moraine. (J.P. Verschuren).

HINTON

1. FOREST TECHNOLOGY SCHOOL
   Alberta Energy and Natural Resources
   Box 880, Hinton TOE 1BO

3. Staff teaching climate related course:

   A.O. Walker - Watershed Management

4. Course:

   FT 415 Watershed Management. Half year.
   Water-its importance and use; hydrologic cycle; the water balance; precipitation, transpiration, evaporation, snow accumulation and melt; soil moisture; infiltration and percolation; watershed management as a component of integrated forest resource use.

5. Equipment:

   Piezometer clusters; snow courses; precipitation gauges; hygrothermographs; watershed flumes; evaporation pan; anemometer and wind recorder.

6. Available climatic measurements:

   Sacromento readings; precipitation data; max. and min. temperatures; relative humidity; snow course data; water well (not published).

LETHBRIDGE

1. LETHBRIDGE COMMUNITY COLLEGE
   Lethbridge T1K 1L6

2. School of Agriculture

4. Course:

   AG 259 Climatology
   A study of elements of weather and climate, atmospheric circulation and disturbances, classification of climates and climatic types. Also included are studies on infiltration, evaporation and transpiration, soil erosion by water and wind, surface and subsurface drainage systems.

LETHBRIDGE

1. UNIVERSITY OF LETHBRIDGE
   4401 University Drive
   Lethbridge T1K 3M4

2. Department of Geography

3. Staff teaching climatology:

   R.J. Fletcher - climate of the Northlands, especially Arctic Canada
   C. Beaty - climate-geomorphology relations, especially snow

4. Courses:

   Geography 3100 Meteorology 1 yr.
   Instruments and their use, energy changes and the forces involved in atmospheric circulation, structure of the atmosphere and behaviour of world weather systems, particular weather phenomena, influence of weather on man, weather modification, weather forecasting.

   Geography 3120 Climatology 1/2 yr.
   Physical principles of weather and climate, classifications of climate, regional climatology, man-climate relationships. Climatic change and cycles.

   Geography 3000, 4000 Selected Topics in Meteorology or Climatology 1/2 yr. once in several years

5. Equipment:

   Weather station; non-recording weather station using U2A wind system plus some sensors; various chart recorders, etc. for temperature, pressure. Recordings from dual sensors onto tape every 15 min. (pressure, temperature, wind, precipitation, solar radiation).

6. Available climatic data:

   See item 5. Also data journals from a number of countries (especially good for Belgium, Cameroon, El Salvador, Guatemala, Iraq, Jamaica, Japan, Malaysia, Mocambique, Philippines, Surinam, Turkey).

1. UNIVERSITY OF LETHBRIDGE

2. Department of Physics

3. Staff teaching climate related courses:

   J.L. Rood

4. Courses:

Meteorology 3150 Theoretical Meteorology 1/2 yr.
Physical principles of atmospheric circulation and disturbances. Aerodynamics. Brief survey of current research topics in Meteorology, including numerical analysis.

Meteorology 4000 Topics in Meteorology once in several years

OLDS

1. OLDS COLLEGE
Alberta Department of Advanced Education
Olds TOM 1PO

2. Department of Business and Humanities

3. Staff teaching climatology:

H. Barber

4. Course:

Ls 221 Meteorology and Climatology
Factors affecting weather and weather systems and the study of climate and its effect on human geography. Includes structure and composition of the atmosphere, energy supply and transfer, frontal systems, weather maps, special weather disturbances, climatic classification, climatic regions of Canada, water balance and budget, climate and soil and plant growth, weather modification and air pollution.

5. Facilities:

Climate station

RED DEER

1. RED DEER COLLEGE
56 Ave. - 32 St.
Red Deer T4N 5H5

2. Department of Geography

3. Staff teaching climatology:

J.A. Proudfoot - Soil temperature-plant growth and relationships

4. Courses:

   Geography 201 Physical Geography 1 yr.
   This is an introductory course in which the physical aspects of the origin, nature and distribution of the natural environment is stressed. Particularly, landforms, weather and climate, vegetation, soils and water are studied through their interrelatedness by the systematic method.

   Geography 309 Intermediate Physical Geography 1 yr.
   Climate, vegetation, soil, water and landforms with stress upon local, regional and world patterns of each.

5. Equipment:

   Soil temperature

VERMILION

1. LAKELAND COLLEGE, VERMILION CAMPUS
   Vermilion TOB 4MO

2. Life Sciences Department

3. Staff teaching climatology:

   R.E. Laurin - Microclimate as it affects spray efficacy
   D. Holgerson
   A.E. Wiebe

4. Courses:

   Life Sciences 221 Climatology 60 hrs.
   General elements of climate as related to Management of Land Resources

   Agricultural and Forestry Aviation
   Some macroclimates that effects flying, but particularly microclimates that affect spray dispersal, drift, deposit, etc.

5. Equipment:

   Sunshine, precipitation, piche and clay disk evapotranspiration, anemometer, relative humidity.

6. Available climatic measurements:

   Precipitation and evapotranspiration data sent to Alberta Department of Environment in summer.

SECTION B. Persons interested in Climatology

R.P. (RANDY) ANGLE

1. Meteorologist, Air Quality Control Branch, Pollution Control Division, Alberta Department of the Environment, 10040-104 Street, Edmonton T5J 0Z8.

2. Air pollution potential, inversion frequencies and correlations, stability class distributions, boundary layer winds.

3. Urban air pollution, modelling, inversion dynamics, acoustic sounding, point source diffusion in irregular terrain.

6. Airflow modification due to change in surface roughness. Univ. Alberta, M.Sc. Thesis. 1973.

Pollution potential in Alberta cities. Alta. Environ., Intern Rept., Nov., 1974.

Airflow from mustard to fallow. Atmosphere 13: 110-125. 1975.

HOWARD BARBER

1. Chairman, Business and Humanities, Olds College, Olds TOM 1PO.

2. Climate and its relationship to agriculture.

4. Climatology and Meteorology.

B.L. BARGE

1. Assistant Research Officer, Research Council of Alberta, Room 204 Campus Tower, 8625-112 Street, Edmonton T6G 1K8.

2. Meso-climatology.

3. Radar meteorology.

5. Thunderstorm energy budgets from radar data. McGill Univ. M.Sc. Thesis, 93 pp. 1968.

Thunderstorm energy budgets from radar data. Proc. 13th Radar Meteor. Conf., Montreal, Amer. Meteor. Soc., 114-117. 1968.

6. Shape, size and surface characteristics of hailstones collected in Alberta. Preprints of Papers, Conf. on Cloud Phys., Ft. Collins, Amer. Meteor. Soc., 83-84. 1970 (with G.A. Isaac).

Polarization observations in Alberta. Preprints of Papers. 14th. Radar Meteor. Conf., Tucson, Amer. Meteor. Soc., 221-224. 1970.

Hail detection with a polarization diversity radar. McGill Univ. Stormy Weather MW-71 Group, Sci. Rep. MW-71. 80 p. 1972 (Also Ph.D. Thesis 1971).

Progress towards developing a radar polarization facility for detecting hail in Alberta. 6th Ann. Cong. Can. Meteor. Soc., Edmonton, Alberta. Res. Counc. Alta., Hail Studies Rept. 72-2:12-16. 1972.

The anisotrophy of precipitation media. Nature, 238(5361): 214-216. 1972. (with G.C. McCormick & A. Hendry).

Radar signal depolarization by hydrometeors in Alberta hailstorms. 15th Radar Meteor. Conf. Urbana-Champaign, Amer. Meteor. Soc. 1-6. 1972.

Polarization measurements of precipitation backscatter in Alberta. Alberta Research, Hail Studies Report 73-1: 1-6. 1973.

The shape of Alberta hailstones, J. de Rech. Atmos. 1:11-20. 1973. (with G.A. Isaac).

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CHESTER B. BEATY

1. Professor, Dept. of Geography, Univ. of Lethbridge, Lethbridge, Alberta, T1K, 3M4.

2. Primarily indirect-geomorphic processes.

3. Mainly geomorphology; am interested in microclimatic effects in landscape evolution.

4. Climatology section in our introductory physical geography course (Geog. 1000).

5. Desert flood conditions in White Mountains of California and Nevada. QM Research and Engineering Command, U.S. Army, Natick, Mass. Tech. Rept. EP-108, 108 pp. 1959. (with J.E. Kesseli).

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CHARLES D. BIRD

1. Professor of Botany, Department of Biology, University of Calgary, Calgary T2N 1N4.

2. Phenology-growth periods.

3. Phenology-phytogeography and taxonomy of plants.

4. Some climatology is taught in Biology 501-Biogeography.

6. 1973 flowering dates. Alta. Naturalist 4:7-14. 1974.
1974 Alberta flowering dates. Alta. Naturalist 5: 5-23.1975.
1975 Alberta flowering dates. Alta. Naturalist 6:3-27. 1976.

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1. Associate Professor, Department of Geography, University of Alberta, Edmonton T6G 2H4.

2. Micro-climate, especially cavern.

3. Micro-climate, especially cavern.

4. Microclimatology.

5. Micrometeorology observations in a remarkable ice cave. Trans., Amer. Geophys. Union 49:693. 1968. (with T.M.L. Wigley and D.C. Ford).

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FRED BURBIDGE

1. Supt. Scientific Services, Western Region, Atmospheric Environment Service, Environment Canada, 10225-100 Ave., Edmonton T5J 0A1.

2. Arctic Climatology; Alberta Watershed; Instruments and site locations.

3. Mackenzie Valley, Hudson Bay, Alberta Watershed.

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1. Retired, 4950 Thunderbird Place, Victoria, B.C. V8Y 2A1.

2. Bioclimatology.

3. Crop response to climate.

5. Growth and development of some field crops as influenced by climatic phenomena at two diverse latitudes. Can. J. Plant Sci. 37:392-406. 1957.

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6. Shelterbelts for the Peace River Region. Can. Dept. Agric., Publ. 1384. 1969. (with R.E. Harris)

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Climate of the Mackenzie Plain. Can. Dep. Agric., Publ. 1554. 1975.

ROBERT B. CHARLTON

1. Assistant Professor, Department of Geography, Division of Meteorology, University of Alberta, Edmonton T6G 2H4.

2. Hail Studies, Urban climates, Climate of Edmonton, Industrial Influence on Climate.

3. Hail, Air Pollution, Stable Isotopes, Satellite Meteorology, Radar Meteorology.

4. Introduction to Meteorology.

5. Growth and feedback mechanisms of hailstones in one-dimensional, steady-state model clouds. 5th Conf. Severe Local Storms, St. Louis, Missouri, Oct. 19-20, 1967. (with R. List and P.I. Buttuls).
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6. Inertial effects on hailstones in oscillating updrafts. Proc. 6th Conf. Severe Local Storms, Chicago, Illinois, April 8-10, 1969: 264-266. (with R. List and D.F. Parsons).

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A numerical model of graupel initiation from ice crystals. 10th Cong. Quebec City, 1976. (with L. Cheng) Can. Meteorol. Soc., Quebec City, May 26-28, 1976. (with L. Cheng).

J.P. CROWLEY

1. Senior Climatologist, Intera Environmental Consultants Ltd. 603-7th. Ave. S.W., Calgary, T2P 2T5.

2. Weather Modifications, Paleoclimatology, Microclimate and Geomorphic processes.

3. Shelf cloud penetration, studies utilizing instrumented aircraft in severe storm environments.

BRUCE P. DANCIK

1. Assistant Professor, Department of Forest Science, The University of Alberta, Edmonton.

2. Climatic effects on tree growth; Genetic differentiation of woody plants in response to climatic variables.

3. Genecology of the paper birch complex in western Canada; Natural genetic variation of forest trees of Alberta.

4. Very small portions of Forestry 315--Dendrology.

FRANKLIN D. DAVIES

1. Hydrologist. Alberta Department of Environment, Hydrology Branch, 10040-104 St., Edmonton T5J 0Z6.

2. Temperature, precipitation, evaporation.

MERVYN J. E. DAVIES

1. Environmental Meteorologist, Western Research and Development Ltd., #3 1313 44th. Ave. N.E., Calgary, Alberta T2E 6L5.

2. Urban climatology and diffusion climatology, both with respect to air quality.

6. A study of low temperature fog in Edmonton, Alberta. submitted to "Arctic" April 1976.

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2. Establishment and maintaining of climatological network, and quality control of output data.

JOHN ENGLAND

1. Assistant Professor, Dept. of Geography, University of Alberta, Edmonton T6G 2H4.

2. Paleoclimatic change, quaternary environments, glacio-climatic systems Arctic Canada.

3. Past Glacial activity in the Canadian and Greenland High Arctic. Also recent climatic change in the same area.

4. Quaternary climatic change (with particular reference to Arctic Canada).

6. A note on the holocene history of a portion of northernmost Ellesmere Island. Arctic 27:154-157. 1974.

   Advance of the Greenland Ice sheet on to north-eastern Ellesmere Island. Nature 252:373-375. 1974.

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ROY JACKSON FLETCHER

1. Associate Professor, Department of Geography, U. of Lethbridge, Lethbridge T1K 3M4.

2. Synoptic climate, esp. atmosphere/ocean surface relationships to widespread extremes in weather and climate.

3. Atmospheric conditions and causes of precipitation extremes in Southern Alberta.

4. Climatology-Geography 3120.

6. A proposed modification of Köppen to incorporate seasonal precipitation. J. Geog. 68:347-350. 1969.

   Some spatial relationships between sea surface temperature departures and general circulation of the atmosphere. Proc. Ann. Meeting, Can. Assoc. Geog. pp. 105-112. 1970.

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CONRAD D.W. GIETZ

1. Supervisor, Agrometeorology, Alberta Agriculture, 9718-107 Ave., Edmonton T5K 1E4.

2. Agricultural applications--climate and bio-climatic relationships.

6. Role of meteorology in agriculture. pp. 1-14. Proc. Alta. Agrometeor. Workshop, Lethbridge, March 24, 1976. Alta. Agric. 1976.

DON GILL

1. Associate Professor, Dept. of Geography, University of Alberta, Edmonton T6G 2G6.

2. Bioclimate--snow as a bioclimatic agent (ecology of snow). Bioclimate of Mackenzie Delta (effect of spring flood on bioclimate).

6. Differences in rainfall and soil moisture distribution in a northern boreal forest stand. Polarforschung 44: 54-59.1974.

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The significance of spring breakup to the bioclimate of the Mackenzie Delta. In Reed, J.C. and J.E. Sater (Eds.). The Coast and Shelf of the Beaufort Sea. Arctic Inst. North Amer., Arlington Va. 1975.

MARIO B. GIOVINETTO

1. Professor and Department Head, Dept. of Geography, University of Calgary, Calgary T2N 1N4.

2. Water Budget Climatology, Paleoclimatology, Glaciology.

3. Mass budget of ice fields in South American Andes and general atmospheric circulation in South American sector.

4. Introductory weather and climate, Climatic change; Seminar in climatology and hydrology.

5. Deformation of the Ross Ice Shelf near the Bay of Whales, Antarctica. Amer. Geog. Soc., I.G.Y. Glaciological Rept. Ser. No 3, 1960. (with J. Zumberge, R. Reid, R. Kehle).

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6. The Antarctic ice sheet and its probable bimodal response to climate. Assoc. Intern. Hydrol. Sci., Publ. No. 86, 1970.

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   Precipitation in Arctic and Antarctic coastal barrens. In Polar Deserts and modern Man. T.E. Smiley and J.H. Zumberge (Eds.). Tucson, U. Arizona Press. 1974.

DOUGLAS L. GOLDING

1. Research Scientist, Northern Forest Research Centre, Canadian Forestry Service, Environment Canada, 5320-122 Street, Edmonton T6H 3S5.

2. Snowpack, chinooks.

3. Snow accumulation and ablation in the forest and forest openings; snowpack ablation during chinooks; energy balance in forest and forest openings; winds in forest openings.

5. Regulation of water yield and quality in British Columbia through forest management. Univ. British Columbia, Ph.D. Thesis. 1968.

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6. Computer mapping of the Marmot Creek snowpack and the influence of topographic and stand variables on the pack. p. 76-83. In Powell, J.M. and C.F. Nolasco (Eds.). Proc. 3rd For. Microclimate Symp., Can. For. Serv., Calgary. 1970.

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Forests and Water. Environ. Can., Forestry Serv., Fact Sheet (In Press). 1976.

GUY G. GOYER

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2. Severe storms climatology.

3. Hailfall, hail suppression, weather modification.

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2. Microclimatology.

3. Micrometeorology, urban climatology, lake evaporation, airflow over inhomogeneous surfaces, precipitation (origin, quality), destructive winds.

4. Geography 433 Microclimatology, Geography 333 Introduction to Weather.

5. On summer cyclogenesis in the lee of the Rocky Mountains. Bull. Amer. Meteorol. Soc., 42: 20-33. 1961.

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6. Ventilation and mixing in Alberta cities. pp. 99-113. In Man and His Environment, Vol. 1, Pergamon Press, Toronto, 1970. (with R.W. Longley).

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1. Research Scientist, Research Branch, Agriculture Canada, Sidney, B.C. V8L 1H3 (formerly Research Stn., Beaverlodge).

2. Plant-climate interactions.

6. Rain and snow gauge comparisons. Can. J. Earth Sci. 11:557-564. 1974 (with A.C. Carder).

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Effect of altitude on temperature, and the earliness and yield of spring wheat in Northern Canada - unpublished 1976.(with A.C. Carder).

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1. Professor, Dept. of Geography, University of Calgary, Calgary T2N 1N4.

2. Soil moisture balance; effects of climate on soil forming processes, geomorphological processes; permafrost: effect on ecology.

3. Vermilion Pass Fire Study; alpine soil temperatures and permafrost; present-day geomorphological and pedological processes, soil moisture regimes.

6. Three modifications to produce more accurate measurements of snowfall and evapotranspiration. Can. Geog., 16: 271-277. 1972.

   Three modifications to produce more accurate measurements of snowfall and evapotranspiration: a reply. Can. Geog. 17: 282-287. 1973.

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   Annual soil moisture regimes in the rooting zones across the prairie-forest boundary of south-west Alberta. J. Soil Sci., 25: 448-460. 1974.

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1. Head, Veterinary-Medical Entomology Section, Research Station, Research Branch, Agriculture Canada, Lethbridge T1J 4B1.

2. Agrometeorology--particularly with reference to livestock production, pest management and arbovirus diseases in man and animals.

3. Environmental influences and host-parasite systems in animals; ecosystem analyses with particular reference to biometeorology.

4. Field Course on Medical Entomology in the Master of Pest Management Program, Simon Fraser University.

5. Synoptic correlation of weather with mosquito activity. Proc. 3rd Int. Biometeor. Cong., Biometeorology II: 523-540. Pergamon Press, 1966.

   The significance of biometeorology in the ecology of insects. Int. J. Biometeor. 10:241-252. 1966.

   Quantitative measurements of activity of Aedes aegypti (L.) in response to changes in hygrothermal environment. Int. J. Biometeor. 7: 245-264. 1964.

6. Response of mosquitoes to simulated changes in altitude and a reassessment of the influence of atmospheric pressure on behavior. Proc. 5th Int. Biometeor. Cong., Montreux. Biometeorology 4, Part II, 48-49 (Appendices and charts in archives). 1969.

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1. Research Director, Vegetation Survey Section,R.M. Hardy & Assoc., Environmental Div., 205-5th Ave. S.W., Box 9237, Calgary, Alberta T2P 2W5.

2. As it relates to vegetation pattern.

3. Description and classification of plant communities and their relationship to environmental factors.

6. Energy dynamics and biomass of desert annuals, S. New Mexico. M.Sc. Thesis, New Mexico State Univ., Las Cruces, N. Mexico. 1969.

   Vegetation of the Vine Creek Drainage Basin, Jasper National Park. Ph.D. Thesis, Dept. Botany. Univ. of Alberta. 1975.

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1. Assistant Professor, Department of Forest Science, University of Alberta, Edmonton.

2. Climatological effects on tree growth and physiology. Effects of climate on land use capability.

3. Regeneration in white spruce.

4. Silviculture I-forest ecology.

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1. Research Scientist, Agriculture Canada, Research Station, Lethbridge T1J 4B1.

2. Relations of crops to their aerial environment.

3. Evapotranspiration of irrigated crops and the use of meteorological parameters in scheduling irrigation.

5. A comparison of measured and calculated evapotranspiration for alfalfa in southern Alberta. Can. Agr. Eng. 8: 9-11. 1966 (with K.K. Krogman).

   Evapotranspiration from alfalfa as related to evaporation and other meteorological variables. Can. J. Plant Sci. 46:271-277. 1966 (with K.K. Krogman).

   Observed and estimated evapotranspiration in southern Alberta. Trans. Amer. Soc. Agric. Eng. 11:502-507. 1968 (with K.K. Krogman).

6. Evaluation of a method of irrigation scheduling. Can. Agr. Eng. 12: 25-27. 32, 1970 (with K.K. Krogman).

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   Overwinter precipitation storage in irrigated and non-irrigated Chin loam soil. Can. J. Soil Sci. 51: 13-18. 1971 (with K.K. Krogman)

   Air-water temperature relations of small shallow prairie reservoirs. Can. Agr. Eng. 14: 75-78. 1972.

   Crop cooling with sprinklers. Can. Agr. Eng. 15: 6-8. 1973.

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2. Mountain and alpine climatology & meteorology; Alberta climatology; Arctic; synoptic aspect of climatology.

3. Climatology of the National Parks; heavy snowfalls in Southern Alberta.

4. Annual Fire Weather seminar (about one week in April).

5. Tropopause analysis-- Internal Meteor. Br. Publication .

   Southern Alberta's paralyzing snowstorms in April 1967. Weatherwise 21: 70-77. 1968 (with E.L. Treffry).

6. Synoptic patterns associated with heavy spring snowfalls in Southern Alberta. Proc. 44th Annu. Western Snow Conf., April 20-22, 1976, Calgary, Alberta (in press).

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1. Senior Technologist, Alberta Environment, Hydrology Branch, 10040-104 St., Edmonton T5J 0Z6.

2. Use of all climate data to determine runoff patterns in general and to solve local drainage problems.

3. Snow melt--runoff relationships.

4. Snow pillow experience in a prairie environment. 44th Annu. Western Snow Conf., Calgary, Alberta, April 20-22, 1976 (in press).

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2. Inversion climatology. Analogue weather map climatology and operational forecast applications.

3. Weather map patterns and applications for Alberta. Inversion climatology of Edmonton.

4. Weather map typing and application for Alberta. Univ. of Alberta, M.Sc. Thesis. 1974.

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1. Research Associate, Alberta Oil Sands Environmental Research Program, Dept. of Botany, University of Alberta, Edmonton.

2. Microclimatology; energy budgets; computer simulation; arctic studies; instrumentation & techniques in remote areas.

3. Long term prediction of vegetation performance for dike management.

4. Microclimatology & Plant Ecology, Laurentian University, 1975-1976.

5. Measurement & computer simulation of microclimatic differences between a polar desert plateau and nearby coastal lowland. M.Sc. Thesis in Agrometeorology, Univ. of Guelph. 1974.

   The microclimatology of a High Arctic ecosystem. In Truelove Lowland, Devon Island, Canada: High Arctic Ecosystem. (Ed.) L.C. Bliss (in press) (with G.M. Courtin).

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3. Statistical analysis of long-term temperature and precipitation.

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2. Aviation meteorology and met. aspects of large scale spraying projects.

3. Meteorological variables and the effectiveness of large scale spraying projects-specifically the New Brunswick budworm project.

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4. Agric. & Forestry Aviation--April-June each year.

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2. Agrometeorology, effect of climate on crop and animal production.

3. Soil moisture prediction; effect of soil moisture, temperature on applied and stored fertilizer nitrogen.

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2. Primarily hydrometeorology, water balance, climatic relationships to land use patterns, etc.

3. Water Resources of Western Canada; Water Balance re: Syncrude Development; Water Balance re: Cooking Lake Moraine; Water Resources of Oldman River.

4. Geog 468 & 469 on Water Resources; Geog 568 & 569 Water Resources Seminar; Geog 368 Hydrometeorology. Also some in Geog 336 Environment Alberta.

5. Precipitation and streamflow in the Mountain and Foothill Regions of the Canadian Rockies. Prairie Provinces Water Board Report # 6, Regina, 48 p. 1957.

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   Atlas of Alberta. Univ. Alberta Press, Edmonton. 162 p. 1970. (Co-editor with T.A. Drinkwater, E.S. Huestis, D.I. Istvanffy, J.S. Klawe and W.C. Wonders).

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2. Diffusion, climatology, urban climatology, sea ice climatology.

3. Turbulence climatology amid irregular terrain; atmospheric influences on urban air quality.

5. Horizontal temperature profiles in summer near Douglas Point, Ontario. Can. Dept. Transport, Met. Branch CIR-3893, TEC-479. 1963 (with M. Ferland).

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2. Mesoscale circulations in mountainous areas, the chinook and associate phenomena, impact of SO_2 on the forest ecosystem.

3. The chinook project--University of Calgary; the impact of sulphur gas on the forest ecosystem.

4. General Meteorology/weather & climate Geog 305, University of Calgary.

5. Richardsons number in the free atmosphere. Archiv. Met. Geophys. Bioklim.,Ser. A, 17: 1-7. 1967.

6. A study of the structure and behavior of jet streams over the western United States. Colorado State Univ., Tech. Rep. 115 p. 1969.

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2. Air pollution and dispersion of pollutants.

4. EST-500 Environmental Control I - Air pollution.
CHT-782 Design for Pollution Control.

6. Produced analysis of pollutant dispersion for the Alberta Roadbuilders Association pertaining to asphalt emissions. (particulates) 1974.

Dust control in portable asphalt plants. Univ. Calgary, Unpubl. Thesis 1975.

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1. Retired. 11333-73 Ave., Edmonton T6G 0C9.

2. Varied.

5. Meteorology theoretical and applied. McGraw-Hill. New York. 468 p. 1944 (co-author with E.W. Hewson).

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2. Hail; climate modification; cloud climatology.

3. Cloud physics; weather modification; hail suppression.

5. Some effects of high particle concentrations on the growth of precipitation and the dynamics of cloud models. Proc. Int. Conf. on Cloud Physics, Toronto. 1968 (with R. List).

6. Record Canadian hailstones. Bull. Amer. Met. Soc., 56: 1275-1276. 1975 (with L. Wojtiw).

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1. Climatologist--Jr. Research Officer, Atmospherics Division, Alberta Research Council, 8625-112 St., Edmonton T6G 1K8.

2. Urban heat islands and associated air pollution; city planning for growth using the above factors; crop growth--climatic factors, including trend surface analysis, climatological models with respect to crop growth, hail-climatic models.

3. Trend surface and statistical analysis of climatic factors and crop yields, air pollution models and Calgary's urban heat island, strip mines and climatic changes induced by, loss/risk analysis of hail insurance in Alberta.

6. A climatological investigation of air pollutants in Calgary's urban heat island. Univ. Calgary, M.Sc. Thesis. 1974.

Pollution concentration and stratification in urban heat island. Water, Air and Soil Pollution, 4:99-112. 1975 (with L.C. Nkemdirim and R.D. Rowe).

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1. Research Scientist, Agriculture Canada, Research Station, Lethbridge T1J 4B1.

2. Bio-climatology--characterization of climates for growing crop plants--relating weather variables to crop responses.

3. Calculation of corn heat units in the prairies , effect of rainfall, potential evapotranspiration, temperature and soil moisture on yield of rape and rangeland yields.

6. Evaluation of eleven thermal units for predicting soybean development. Crop Science 15: 172-174. 1975 (with D.R. Johnson, V.D. Luedders). Effects of daylength and temperature on soybean development. Crop Science 15: 174-179. 1975 (with D.R. Johnson. J.W. Tanner, I.C. Anderson.)

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2. Agroclimatology as it relates to crop and environment interaction.

3. Plant survival--alfalfa winter survival and predicting crop responses from agrometeorological data.

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3. Synoptic storm studies.

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4. Approximately 2 weeks of fire weather taught as a part of Forestry 340 - Forest Fire Control and Use.

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2. Meteorological data for operational streamflow forecasting.

3. Snowmelt.

6. Daily snowmelt determined from snow pillow data. pp. 296-301. Proc. Can. Hydrol. Symp. Winnipeg, August 11-14, 1975 (with W. Lin).

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1. Associate Professor, Department of Geography, University of Calgary, Calgary, T2N 1N4.

2. Microclimatology, urban climatology, agricultural climatology, hydroclimatology.

3. The urban boundary layer, agricultural climatology.

4. Weather and climate - Geography 305
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5. The water balance of the Loch Greenoch watershed. Hydrological Inst., Tech. Pap., No. 3, 80 pp. 1968.

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3. Carcinogenic hydrocarbons in the urban atmosphere; areal and vertical distribution. Atmospheric carcinogens from oil sands processing and coal mining.

6. Carcinogenic hydrocarbons as pollutants in the atmosphere of the city of Calgary. (with K. Black).

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2. Evapotranspiration, climatic change.

3. Evapotranspiration; Research Management.

5. An evaluation of the Thornthwaite and mean temperature methods for determining potential evapotranspiration. Agron. J., 52: 387-395. 1960 (with K.M. King and C.B. Tanner).

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3. Snow and avalanche studies.

5. Mechanical properties of the soft salb. Alta Avalanche Study Cent. Rept. B-2, 14 p. Alta, Utah. 1967 (with E.R. LaChapelle).

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6. Predicting avalanche danger in the Tien-Shan. (Translation from the Russian paper by Scherbakov). Alta Avalanche Study Cent. Trans. 10, 23 p. Alta, Utah. 1969.

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6. Soil environments in the western Canadian Subarctic. pp. 279-292. In Quaternary Environments: Proceedings of a Symposium. (Ed.) W.C. Mahaney, York Univ., Toronto, Geographical Monog. No. 5. 1974 (with S.C. Zoltai).

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5. The vegetation and microclimate of the Lake Hazen area, northern Ellesmere Island, N.W.T. Arctic Meteorology Res. Gp., McGill Univ., Publ. in Meteorol. No. 38. Defence Res. Bd., Ottawa, Rept. D. Phys. R(G) Hazen 14, 112 pp. 1961.

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1. Professor, Geography Dept., Red Deer College, Red Deer.

2. Micro-climates and their effects on feed lot cattle; cereal grains.

3. Micro-climates and cereals-barley & wheat; micro-temperature-soil-air relationships.

4. Geography 201) Micro-soils and climate elements-Geography 309.
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2. Alberta hailfall, hail damage.

3. Hailstorm kinematics.

5. Stereoscopic cloud photography and measurements. Univ. Alberta, M.Sc. Thesis 1966.

   Alberta Hail studies 1968, field program. Res. Coun. Alta, Edmonton. Unpub. Rept. 1969.

6. Alberta Hail Studies field Program 1969. Res. Counc. Alta, Edmonton. Hail Studies Rept. 69-1. 1970. (editor).

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Weather modification. pp. 34-41. Proc. Alta. Agrometeor. Workshop, Lethbridge, March 24, 1976. Alta. Agric. 1976.

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1. Technician i/c Weather Research Stn. & Lab. Instructor, Dept. of Geography, University of Calgary, Calgary; and Instructor, Dept. of Environmental Sciences, Mount Royal College, Calgary.

2. Chinook, Station network data.

3. Assisting in Chinook Studies and Heat Island Project.

4. U. of Calgary, Geography 305 Laboratories on Instrumentation. Mount Royal College, Climatology--Meteorology on Air Pollution 2 Year Course.

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1. Associate Professor, Forest Science Department, University of Alberta, Edmonton.

2. Precipitation-snowfall-evapotranspiration as they relate to hydrological topics.

3. Water use by lodgepole pine; erosion control at road-stream crossings; effects of land use on water quality.

4. Forest Science 450 Forest and Range Hydrology.
Forest Science 452 Forest Watershed Management.

5. Forest snow accumulation and snow disappearance. Univ. California, School Forestry, Berkely, Calif. M. For. thesis. 1966.

6. Watershed management guidelines for logging and road construction. Can. Dept. Fish. & For., Can. For. Serv., Edmonton. Info. Rep. A-X-42. 1971.

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1. Research Scientist (Atmospheric Sciences), Research Secretariat, Alberta Environment, 10040-104 St., Edmonton T5J 0Z6.

2. Climate of Alberta; air pollution climatology.

3. Photochemical air pollutants in the urban airsheds of Edmonton and Calgary.

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1. Asst. Professor, Dept. of Mechanical Engineering, University of Calgary, Calgary.

2. Building climatology especially the effect of solar radiation on energy balance of specially designed buildings.

3. Weather data analysis--especially solar for use in computer simulation models;--solar environment monitoring at Calgary.

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1. Associate Professor, Department of Geography, University of Alberta, Edmonton.

2. Applied with emphasis on agricultural climatology and the ecology of tropical crop plants.

3. Crop scheduling in relation to local and regional climate; wind and solar energy as supplemental energy sources.

4. Introduction to Climate (Geog 334), Advanced Climatology (Geog 533).

5. Compiler and Editor of: Bellairs Research Institute of McGill University. Climatological Section "Climatic Observations" at Waterford, Barbados, W.I., 1958-1962, Nos. 1-10.

   Evapotranspiration and energy relationships at Waterford, Barbados, 1960. Part B. of McGill Univ., Dep. Geog. Climatol. Res. Ser. #1, 1966. (Co-authored with D. Watts).

6. An analysis of sugar cane yields in Barbados, W.I., 1937-58. Bull., Illinois Geogr. Soc. (Macomb), 17: 14-31.

   Synoptic climatology: by R.G. Barry and A.H. Perry (Review). Atmosphere 12: 121-123. 1974. (Co-authored with E.R. Reinelt).

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4. BSE 450 Bioclimatology and meteorology for Bio Science Students.

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2. As it affects the behavior of forest fires in the province of Alberta. Indirect interest in other areas.

3. Fire danger systems and fire weather patterns and fire-weather climate.

4. Fire weather & fire behavior at Hinton F.T.S. Guest lectures at University of Ablerta (Forestry) and Vermilion College and N.A.I.T.

5. Preliminary synoptic survey of the 1962 hail season in Alberta. Can. Transport, Meteor. Br., Tech. Cir. TEC 443, 29 p. 1962. (with C.E. Thompson).

6. Precipitaiton means. Alberta. Forestry Stations, May to September 1963-1970. Alta. Dep. Lands & Forest, Alta. For. Serv. 32 p. 1971.

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1. Retired, part-time hydrometeorological consultant.
   R.R. 2, Salt Spring Way, Ganges, B.C. VOS 1EO.

2. Alberta and Rocky Mountains--precipitation, temperature, radiation, wind.

5. Maximum one-day rainfall frequencies in Alberta. Can. Transport, Meteor. Br., Tech. Cir. 451. 1963.

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6. Some current studies of local precipitation variability in western Canada. pp. 80-100. Proc. Amer. Water Res. Assoc. Symp. Banff, Alta. June 1969. Urbana, Illinois. 1969. (with H.L. Ferguson).

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1. Meteorologist--Forecast Research, Alberta Hail Project, Mynarski Park TOM 1NO.

2. Climatological Cycles.

3. Hail forecasting primarily-hailfall cycles and long-term temperature cycles, not necessarily relating the two.

5. Heavy snowfalls at Gander, Newfoundland. Can. Dep. Transport, Meteor. Br. CIR-3905, TEC-485. 1963.

6. A note on fluctuations in the normal temperature trend at selected Canadian stations. Atmosphere 13: 19-25. 1975 (with M.L. Khandekar).

A.R. THIRNBECK

1. Chairman, Dept. of Environmental Sciences, Mount Royal College, 4825 Richard Rd., S.W., Calgary T3E 6K6.

2. Climatic modification, agro-& urban microclimatology.

4. Introduction to weather and climate (Pollution emphasis); Introduction Physical Geography.

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2. Promoting climatology as a professional development of the 'Field', operational forecasting Meteorologist; serving customers' with best climatological evidence possible; in our Regional office collaborating with scientific services and data processing unit.

5. Cold lows affecting Alberta in summer. Can. Dep. Transport, Met Div., CIR-1813, TEC-76. 8 p. 1950.

   The problem of hailstorm forecasting in Alberta. Can. Dep. Transport, Met. Div., CIR-2804, TEC-236. 34 p. 1956.

   A study into the causes of hail.J. Appl. Meteor. 4:69-82. 1965 (with R.W. Longley). (plus series of synoptic surveys of annual hail seasons in Alberta.)

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1. Head, Remote Sensing Div., Intera Environmental Consultants Ltd., 603-7th Ave. S.W., Calgary T2P 2T5.

2. Topoclimate, regional climatology on prairies.

6. A climatography of London, Ontario--observations of bright sunshine, 1925-1968. Ont. Geography, 5: 18-27. 1970. (as M.D. Coleman, and with J.M. Havens).

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1. M.Sc. Student in Meteorology (Meteorologist with Atmospheric Environment Service; Environment Canada). Meteorology Division, Dept. of Geography, University of Alberta, Edmonton.

2. Radiational energy budgets, as well as general interests.

3. Determining mixing heights over Alberta using energy budget approach.

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1. Professor, Dept. of Soil Science, University of Alberta, Edmonton, T6G 2E3.

2. Soil erosion as affected by wind, rain & spring run-off. Interested therefore in wind velocities and direction, in rainfall intensities, snowfall and spring melt.

3. Water erosion on plots at St. Albert; extent of strip farming in Alberta.

4. References to climatological data in courses on Soil Conservation, Soil Physics & Irrigation.

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1. Graduate student: climatology, Dept. of Geography, University of Calgary, Calgary T2N 1N4.

2. Urban climatology: "heat islands"; pollution; application of remote sensing to climatology work.

3. Calgary's heat distribution.

4. Lab. instructor: general climatology; microclimatology.

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1. Professor, Dept. of Civil Engineering, University of Alberta, Edmonton.

2. As related to hydrology.

3. Precipitation regime in Northwest Canada.

4. Surface Water Hydrology CIV E 641.
Statistical hydrology CIV E 642.
Hydrology CIV E 541.

6. The precipitation regime in Northwest Canada. Can. Dept. Indian Affairs and Northern Develop. ALUR 72-73-41. 83 p. 1973. (with W. Meheriuk).

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1. Instructor-Forest Technology School, Alberta Energy and Natural Resources, Box 880, Hinton TOE 1BO.

2. Demonstrational and data gathering.

4. FT 415. Watershed Management.

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2. Rainfall, evaporation, soil moisture.

3. Relating crop yields to nutrients applied, soil nutrients and moisture stress.

6. Development of a barley yield equation for central Alberta. 1. Effects of soil and fertilizer N & P. Can. J. Soil Sci. 56: 233-247. 1976. (with L.A. Heapy, D.K. McBeath, H.C. Love, U.M. von Maydell, J.A. Robertson).

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2. Weather forecasting, climatic change. Cloud photography, atmospheric phenomena.

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4. Meteorology and weather forecasting, fire weather in 16 week course.

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5. About 10 studies of arctic climatology, published in the Technical Circular Series of the Meteor. Serv. of Can.--mainly about surface wind behavior but including one on grid method of forecasting plus "arctic weather maps" published by U.S. Navy.

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2. Hail and precipitation climatology in Alberta; hail damage affecting crops.

3. Hail damage to crops and its correlation to hailfall parameters; hailfall patterns in Alberta.

6. Hailfall characteristics and crop damage in Alberta. 4th Cong. Can. Meteor Soc., Winnipeg, June 1970 (with P.W. Summers).

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Hailfall studies: current research on Alberta hailstorms progress report 1974-1975. Alberta Res. Coun. Rept. p. 61-69. 1975.

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The economic impact and regional variation of hail damage in Alberta. 6th. Annu. Cong. Can. Meteor. Soc., Edmonton, Alta., June 1972. (with P.W. Summers).

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1. Assoc. Professor, Dept. of Animal Science, U. of Alberta, Edmonton.

2. Climatic environment and animals.

3. Effects of environment on livestock production (cattle, sheep, swine, wildlife); animal physiology.

4. As part of course (An. Sc. 310) on animal physiology.

6. Some psychological costs of cold climates. Agric. Exp. Sta., Mo. USA. Spec. Rept. 175. 1975.

Effects of winter acclimatization on resting metabolism of beef cows. Can. J. Animal Sci. 55:619-625. 1975.

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Agrometeorological relationships in animal industries. pp. 48-49. Proc. Alta. Agrometeor. Workshop, Lethbridge, March 24, 1976. Alta. Agric. 1976.

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3. Modelling crop management and production in western Canada.

6. Use of meteorology in crop management modelling. pp. 51-69. Proc. Alta. Agrometeor. Workshop, Lethbridge, March 24, 1976. Alta. Agric. 1976.