

REPORT OF THE ESC RESEARCH COMMITTEE
LIST OF STUDIES IN PROGRESS

1. PRECIPITATION AND ACCUMULATION

- 85-1 HYDROLOGIC AND BIOLOGIC ROLES OF ICE, INCLUDING SNOW ON LAKES--
Peter Adams, Trent University, Peterborough, Ontario, K9J 7B8

Progress

This work has been conducted for seven years in Ontario and in Labrador. In 1983 it was extended to include Axel Heiberg Island, Northwest Territories.

Recent Reports

Adams, W.P., 1984, Ice, Including Snow Research at Trent University, Peterborough, Ontario With a Bibliography for 1984, prepared for symposium on Snow and Ice Chemistry in the Atmosphere, 16 p.

Adams, W.P. and Roulet, N.T., 1984, Sampling Snow and Ice on Lakes, Arctic, (in press).

Adams, W.P. and Lasenby, D.C., 1985, The Roles of Snow, Lake Ice and Water in the Distribution of Major Ions in the Winter Cover of a Lake, Annals of Glaciology, 7, (in press).

- 85-2 WINTER CLIMATIC SURVEY OF THE OHIO RIVER VALLEY REGION--
Michael A. Bilello, CRREL, 72 Lyme Road, Hanover, New Hampshire, 03755-1290, U.S.A.

Objectives

To compile and analyze information on the winter climate along the entire length of the Ohio River Valley.

Current Progress

Weather records for 80 locations along the river were used to derive a series of maps and inter-relationships between station elevation, mean monthly winter air temperatures, and total seasonal water-equivalent precipitation.

Recent Reports

The study is completed and will be included in a three-part Ohio River ice and environmental CRREL River Ice Management (RIM) Project currently in progress.

- 85-3 SNOW DRIFT MODELLING--James D. Iverson, Iowa State University, Ames, Iowa, 50011, U.S.A.

Objectives

To understand snow deposition physics and small scale modelling.

Recent Reports

Iverson, J.D., 1984, Comparison of Snowdrift Modelling Criteria, Cold Regions Science and Technology, Vol. 9, pp. 259-265.

Greeley, R. and Iversen, J.D., 1985, Wind as a Geological Process, Cambridge University Press, 333 p.

2. DEVELOPMENT OF EQUIPMENT

- 85-4 DEVELOPMENT OF THE LARGE NIPHER SHIELD FOR RECORDING PRECIPITATION GAUGES--B.E. Goodison and J.R. Metcalfe, Atmospheric Environment Service, 4905 Dufferin Street, Downsview, Ontario, M3H 5T4

Objectives

To develop a shield which would provide more accurate gauge measurements of snowfall and also provide data compatible with measurements from official MSC Nipher snow gauge.

Recent Reports

Goodison, B.E. and Metcalfe, J.R., 1980, AES Nipher Shields for Recording Precipitation Gauges: An Assessment, Proc. ESC 37th Annual Meeting, Peterborough, Ontario, 5-6 June 1980, pp. 196-198.

Goodison, B.E. and Metcalfe, J.R., 1982, Canadian Snow Gauge Experiment: Recent Results, Proc. WSC, Reno, Nevada, 19-23 April 1982, pp. 192-195.

Goodison, B.E., Turner, V., and Metcalfe, J.R., 1983, A Nipher-Type Shield for Recording Precipitation Gauges, 5th Symposium on Meteorological Observations and Instrumentation, 11-15 April 1983, Toronto, Ontario, American Meteorological Society, Boston, Mass., p. 21-26.

- 85-5 DEVELOPMENT OF ULTRASONIC SNOW DEPTH SENSOR--B.E. Goodison, R. Wilson, J.R. Metcalfe, Atmospheric Environment Service, 4905 Dufferin Street, Downsview, Ontario, M3H 5T4.

Objectives

To develop a low cost, automatic, snow depth sensor for use at remote (unmanned) data collection stations.

Current Progress

Field trials using an ultrasonic based system indicate RMS error of <2 cm.

Recent Reports

Goodison, B.E., Wilson, R., Wu, K., and Metcalfe, J.R., 1984, An Inexpensive Remote Snow-Depth Gauge: An Assessment, Proc. Western Snow Conference, 52nd Annual Meeting, Sun Valley, Idaho, 17-19 April 1984, pp. 188-191.

Goodison, B.E., Wilson, R., and Metcalfe, J.R., 1985, An Inexpensive Remote Snow Depth Gauge, WMO Technical Conference on Instruments and Methods of Observation (Tecimo-III), 8-12 July 1985, Ottawa, Ontario.

3. SNOWMELT AND STREAM FLOW

- 85-6 ACIDIC SNOW MELT SHOCK POTENTIAL STUDY - DORSET, ONTARIO--
B.E. Goodison, P.Y.T. Louie, J.R. Metcalfe, Atmospheric Environment Service, 4905 Dufferin Street, Downsview, Ontario, M3H 5T4.

Objectives

To conduct a field study to collect suitable data on melt rate, snowpack and melt water chemistry to verify and improve energy budget/chemistry models used to determine snowmelt characteristics and snowpack acidity.

Recent Reports

Goodison, B.E. and Metcalfe, J.R., 1984, Design, Instrumentation and Operation of a Snowmelt Runoff Plot, Proc. ESC 41st Annual Meeting, New Carrollton, Maryland, U.S.A., 7-8 June 1984.

4. HYDRAULICS AND SNOW LOADS

- 85-7 SNOW LOADS ON ONE AND TWO-LEVEL FLAT ROOFS IN CANADA--
D.A. Taylor, Division of Building Research, National Research Council of Canada, Ottawa, Ontario.

Objectives

To study the density, depth and snow loads on multi-level flat roofs to improve the requirements in the National Building Code of Canada.

Progress

Field measurements completed, some analysis done.

Recent Reports

Taylor, D.A., 1984, Snow Loads on Two-Level Flat Roofs, Proc. Eastern Snow Conference, Vol. 29, 41st Annual Meeting, Washington, DC, 7-8 June 1984, p. 3-13.

- 85-8 SNOW DEPTHS AND DENSITIES ON ROOFS IN BRITISH COLUMBIA AND THE NORTH--D.A. Taylor, Division of Building Research, National Research Council of Canada, Ottawa, Ontario.

Objectives

To obtain better design snow loads for locations in the mountains and valleys of British Columbia and in the Yukon and Northwest Territories.

Progress

Fifth winter of observations just completed.

Recent Reports

None.

- 85-9 MODEL STUDIES OF SNOW DRIFTING ON ROOFS--F. da Matha Sant'Anna and D.A. Taylor, Division of Building Research, National Research Council of Canada, Ottawa, Ontario.

Objectives

To determine if adequate simulations of snow drifting on roofs can be obtained in a wind tunnel.

Progress

Program completed.

Recent Reports

da Matha Sant'Anna, F., Part I, Snow Drifts on Flat Roofs. Part I: Analytical Approach, submitted to J. of Wind Engineering and Industrial Aerodynamics.

da Matha Sant'Anna, F., and Taylor, D.A., Part II, Snow Drifts on Flat Roofs. Part II: Wind Tunnel and Field Measurements, in draft form.

- 85-10 SNOW AND ICE LOADS ON SLOPING GABLE AND SHED ROOFS--D.A. Taylor, Division of Building Research, National Research Council of Canada, Ottawa, Ontario.

Objectives

To study factors affecting the accumulation of snow and ice loads on gable and shed roofs of various slopes and surfaces roughnesses.

Progress

Nine years of pilot study on experimental roofs at NRC completed; observations continue.

Recent Reports

Taylor, D.A., 1983, Sliding Snow on Sloping Roofs, Canadian Building Digest 228, November 1983, 4 p.

Taylor, D.A., 1985, Snow Loads on Sloping Roofs: Two Pilot Studies, Can. J. Civ. Eng., Vol. 12, No. 2, p. 334-343.

- 85-11 RE-ANALYSIS OF THE 30 YEAR RETURN GROUND SNOW LOADS--M. Newark, Atmospheric Environment Service, Downsview, Ontario.

Objectives

To greatly expand the number of stations for which the 30 year ground snow loads are given; to base these loads on the measured depths and (for the first time) measured densities and

corresponding winter rainfalls; to report the weight of winter rain as a separate time.

Progress
Completed.

Recent Reports

Newark, M.J., 1984, A New Look at Ground Snow Loads in Canada, Proc. Eastern Snow Conference, 41st Annual Meeting, Washington, DC, 7-8 June 1984, p. 37-48.

- 85-12 RE-ANALYSIS OF ROOF SNOW LOAD DESIGN FACTORS--D.A. Taylor, Division of Building Research, National Research Council of Canada, Ottawa, Ontario.

Objectives

To examine the changes required to the roof snow load factors in the 1985 National Building Code of Canada (NBCC) and Commentary on Snow Loads to make them compatible with the new 30-year return ground snow loads for the 1980 NBCC.

Progress
Work starting.

5. REMOTE SENSING

- 85-13 AIRBORNE GAMMA RADIATION SNOW WATER EQUIVALENT AND SOIL MOISTURE MEASUREMENTS--T.R. Carroll, National Weather Service, 6301 34th Avenue South, Minneapolis, MN, 55450, U.S.A.

Objectives

Ongoing research is conducted to assess and minimize the errors in airborne snow water equivalent and soil moisture measurements using natural terrestrial gamma radiation collected from a low flying aircraft.

Current Progress

Recent results indicate an ability to make airborne snow water equivalent measurements with an RMS error of 8 mm over agricultural environments and approximately 20 mm over forested environments.

Recent Reports

Carroll, T.R. and Marshall, R.D., 1985, Cost-Benefit Analysis of Airborne Gamma Radiation Snow Water Equivalent Measurements Made Before the February 1985 Fort Wayne Flood, presented at Sixth Conf. on Hydrometeorology, sponsored by American Meteorological Society, Indianapolis, IN.

Carroll, T.R., 1985, Airborne Snow Water Equivalent and Soil Moisture Measurements Used in Operational Hydrology, invited paper given at American Institute of Hydrology, A National

Survey: Selected Problems and Solutions in Applied Hydrology and Hydrogeology, Minneapolis, MN.

Vogel, R.M., Carroll, T.R., and Carroll, S.S., 1985, Simulation of Airborne Snow Water Equivalent Measurement Errors Made Over a Forest Environment, Proc. American Society of Civil Engineers Symposium, Denver, CO, pp. 9.

Carroll, T.R., 1985, Snow Surveying, McGraw-Hill 1985 Yearbook of Science and Technology, p. 386-388.

Carroll, T.R. and Vose, G.D., 1984, Airborne Snow Water Equivalent Measurements Over a Forested Environment Using Terrestrial Gamma Radiation, Proc. 41st Annual Eastern Snow Conference, New Carrollton, MD, pp. 19.

Carroll, T.R., Glynn, J.E., and Goodison, B.E., 1983, A Comparison of U.S. and Canadian Airborne Gamma Radiation Snow Water Equivalent Measurements, Proc. 51st Western Snow Conference, Vancouver, WA, p. 27-37.

Carroll, T.R. and Schaake, J.C., 1983, Airborne Snow Water Equivalent and Soil Moisture Measurements Using Natural Terrestrial Gamma Radiation, Proc. Soc. of Photo-Optical Instrumentation Engineers, Vol. 414, p. 208-213.

- 85-14 MICROWAVE REMOTE SENSING OF SNOW--B.E. Goodison, Atmospheric Environment Service, 4905 Dufferin Street, Downsview, Ontario, M3H 5T4.

Objectives

To develop a relationship between snow water equivalent and airborne passive microwave data.

Current Progress

Initial results indicate a relationship similar to that proposed by Kunzi and Rott may in fact exist for the Prairie data set.

Recent Reports

Goodison, B.E., Banga, A., and Halliday, R.A., 1984, Canada United States Snow Cover Runoff Study, Can. Wat. Res. Journ., Vol. 9, No. 1, pp. 99-107.

Carroll, T.R., Glynn, J.E., and Goodison, B.E., 1983, A Comparison of U.S. and Canadian Airborne Gamma Radiation Snow Water Equivalent Measurements, Proc. Western Snow Conference, 51st Meeting, p. 27-37.