

EASTERN SNOW CONFERENCE RESEARCH COMMITTEE

LIST OF STUDIES IN PROGRESS

1. PROPERTIES OF SNOW AND ICE

- 74-1 CHEMISTRY OF THE SNOWPACK AT HUBBARD BROOK EXPERIMENTAL FOREST--James Hornbeck & Gene Likens; USFS & Cornell University, Durham, N.H.

Objectives: The chemical characteristics of the snowpack are being measured routinely during accumulation and melt. The findings will be related to other components of the biogeochemical cycle being studied at Hubbard Brook. This study was initiated in December, 1972.

Recent Reports: Hornbeck, J.W. and G.E. Likens. THE ECOSYSTEM CONCEPT FOR DETERMINING THE IMPORTANCE OF CHEMICAL COMPOSITION OF SNOW. Paper presented at Interdisciplinary Symposium on Advanced Concepts and Techniques in the Study of Snow and Ice Resources. Dec. 2-6, 1973, Monterey, California.

- 74-2 NORMAL FREEZING AND THAWING INDICES FOR CANADA--Donald W. Boyd, Div. of Building Res., Nat. Res. Counc. Canada, Ottawa, Ontario.

Objectives: To provide averages for the 30-year period 1931 to 1960 of the net monthly and annual degree days above and below 32F in tabular form for over 800 weather stations in Canada and to prepare two small scale maps showing the general distribution. Progress: completed.

Recent Reports: Boyd, D.W. NORMAL FREEZING AND THAWING DEGREE-DAYS FOR CANADA 1931-1960 (CL1 4-73). Available from: Atmospheric Environment Service, 4905 Dufferin Street, Downsview, Ontario M3H 5T4, Canada. Price: 50 cents.

- 74-3 BAFFIN BAY - NORTH WATER PROJECT, Dr. Fritz Muller, McGill University, Montreal.

Objectives: Glacio-climatology programs: 1) to measure the energy and mass exchanges and wind stresses at the North Water polynia and surroundings, 2) to assess the amount and position of open water, melting zones, refreezing areas and pressure ridges and different sea-ice forms and their movement in the area, 3) to assess on a meso-scale the air mass modification induced by the open water, and 4) to identify the origin of the air moisture in the areas as cyclonic or

local mainly by means of isotope studies carried out at the three all-year-round manned stations and in firn pits on the surrounding ice-caps.

Recent Reports: No recent report titles provided. Detailed list of pertinent publications available for sale can be obtained by writing to Dr. Fritz Muller, McGill University, Montreal.

- 74-4 DEFORMATION AND FAILURE OF ICE--L.W. Gold, Geotechnical Section, Div. of Building Research, National Research Council Canada, Ottawa, Ontario K1A 0R6, Canada.

Objectives: To establish the dependence of the deformation and failure of ice on stress, temperature and time.

Recent Reports: (1) 1972, L.W. Gold, "The Failure of Ice, NRCC 12503, National Research Council Canada, Ottawa.

(2) 1972, L.W. Gold, "The Process of Failure of Columnar-Grained Ice", NRCC 12648, National Research Council Canada, Ottawa.

(3) 1972, R. Frederking, "Preliminary Results of Plane Strain Compression of Columnar Grained Ice", Proceedings IAHR Ice Symposium, Leningrad, September, 1972.

(4) 1972, L.W. Gold, "Activation Energy for Creep of Columnar-Grained Ice", presented to the Int. Symp. on the Physics and Chemistry of Ice, Ottawa, 1972.

2. PRECIPITATION AND ACCUMULATION

- 74-5 A STUDY OF SNOW COVER ACCUMULATION IN THE MACKENZIE VALLEY, N.W.T., CANADA--D.M. Gray, Div. of Hydrology, University of Saskatchewan, Saskatoon, Saskatchewan.

Objectives: 1) To delineate, describe and relate quantitatively the maximum snow accumulation patterns under different types of terrain, climatic conditions and vegetae cover, 2) to utilize the results to develop a predictive model of "Snow Cover Accumulations:and describe sampling procedures to be followed in obtaining accurate depth and density estimates for different land use - vegetae cover classes, 3) to establish correlations between the data obtained in the study with measurements available from long-term observation stations, 4) to obtain information on the sequential disappearance of the snow cover and 5) where possible to obtain "base-line" information re snow characteristics with specific reference to stratification, hardness and den-

sity and, thermal conductivity.

Recent Reports: Most of the field observations have been taken. A final report is to be delivered to Atmospheric Environment Service, Canada by March 31, 1974.

- 74-6 PEATMOS PROBABILITY OF PRECIPITATION FORECASTS AS AN AID IN PREDICTING PRECIPITATION AMOUNTS--Stanely E. Wasserman, National Weather Service, Eastern Region, Garden City, N.Y.

Objectives: The National Weather Service has developed a method of using Primitive Equation and Trajectory Model Output Statistics (PEATMOS) for determining the probability of precipitation (PoP) equal to or exceeding .01" in specified 12-hour periods. In this study the frequency of occurrence of 12-hour precipitation amounts exceeding other specified quantities in addition to .01 inch is determined as a function of the PEATMOS PoP.

Recent Reports: No recent report titles provided.

- 74-7 FREQUENCY AND INTENSITY OF FREEZING RAIN/DRIZZLE IN OHIO--Marvin E. Miller, National Weather Service, Eastern Region, Garden City, N.Y.

Objectives: During the winter seasons of 1970 and 1971, the author received several requests from cable television companies and from insurance companies regarding the frequency and intensity of ice storms in Ohio. A search of available literature failed to uncover pertinent information on this subject. It was because of the interest and total lack of information on ice storms in Ohio that this study was undertaken.

Recent Reports: No recent report titles provided.

- 74-8 A PROCEDURE FOR IMPROVING NATIONAL METEOROLOGICAL CENTER OBJECTIVE PRECIPITATION FORECASTS--WINTER SEASON--Joseph A. Ronco, Jr., National Weather Service, Eastern Region, Garden City, N.Y.

Objectives: A procedure for using the Limited-Area Fine-Mesh Model (LFM) (1) quantitative precipitation forecasts (QPF) to improve National Meteorological Center (NMC) objective probability of precipitation (PoP) forecasts in the summer was presented in NOAA Technical Memorandum NWS ER-49 (2). A similar procedure applied to winter data is now presented. The NMC objective PoP forecasts are derived using Primitive Equation and Trajectory Model Output Statistics (PEATMOS) (3).

Recent Reports: No recent report titles provided.

74-9 AXEL HEIBERG ISLAND, Dr. Fritz Muller, McGill University, Montreal.

Objectives: Continuing established programs of synoptic and meso-scale meteorological observations, accumulation and ablation studies on the White and Baby glaciers, glacier movement studies on the White Glacier and further work with the several automatic weather stations.

Recent Reports: No recent report titles provided.

74-10 PREDICTION OF WINTER ENVIRONMENT--Michael A. Bilello, U.S. Army Cold Regions Research and Engineering Laboratory, Hanover, N.H., 03755.

Objectives: The purpose of this research is to provide a description of snow and ice surfaces and establish techniques to predict this aspect of the environment using certain climatic and meteorological parameters. Field data collected from an established network of observing stations has provided new information to permit analysis of regional and seasonal variations in snow, ice and winter climates.

Recent Reports: (1) "Ice Thickness Observations, North American Arctic and Subarctic, 1968-1969, 1969-1970." USA CRREL S. R. 43- Part VI.

(2) "A Survey of the Urban and Suburban Climate in Southeast Michigan." Reprint from Symposium on Frost Action on Roads.

(3) "Mesoscale Measurement of Snow over Properties." Reprint from Symposium on the Role of Snow and Ice in Hydrology.

(4) "Prevailing Wind Direction of the Arctic Ocean." USA CRREL R. R. 306.

(5) "Thickness and Temperature Gradients of Arctic and Subarctic Inversions". Presented at the Annual Meeting of the Canadian Association of Geographers.

3. SNOWPACK MEASUREMENT

74-11 ANNUAL SPRING SNOW SURVEY AND SPRING FLOOD FORECAST 1973 (Period March 7 - 8, 1973)--W.R. Haynes, Newfoundland and Labrador Power Commission, Bishop's Falls, Newfoundland.

Objectives: To reduce spillage and retain the maximum amount of snow melt in four reservoirs in series, consistent with safety and the capacity of the gates and canals to handle the inflow. As more surveys become available, it is intended

to analyse the actual inflows with those predicted from the snow courses. This analysis will enable us to improve our forecasts and possibly change certain assumptions such as the effects of ground water.

Recent Reports: These surveys and future studies are available from W.R. Haynes, Newfoundland & Labrador Power Comm., Bishop's Falls, Nfld.

- 74-12 SECOND SNOW SURVEY AND SPRING FLOOD FORECAST 1973 (Period April 24 - 25, 1973)--W.R. Haynes, Newfoundland and Labrador Power Commission, Bishop's Falls, Newfoundland.

Objectives: To reduce spillage and retain the maximum amount of snow melt in four reservoirs in series, consistent with safety and the capacity of the gates and canals to handle the inflow. As more surveys become available, it is intended to analyse the actual inflows with those predicted from the snow courses. This analysis will enable us to improve our forecasts and possibly change certain assumptions such as the effects of ground water.

Recent Reports: These surveys and future studies are available from W.R. Haynes, Newfoundland & Labrador Power Comm., Bishop's Falls, Nfld.

- 74-13 CHEMICALS TO IMPROVE SNOW FOR SKIING AND THE IMPACT OF THE CHEMICALS ON THE ENVIRONMENT--MacConnell, W.P.; Mader, D.L.; and Whitney, L.F.; Univ. of Massachusetts, Amherst, Mass.

Objectives: To improve the engineering characteristics of snow for skiing.

Recent Reports: Reprints may be obtained from Prof. Wm. MacConnell, Holdsworth Hall, Univ. of Mass., Amherst, Mass.

- 74-14 CONTINUING PROGRAM OF SNOW-COVER INVESTIGATION IN TWO IDH REPRESENTATIVE DRAINAGE BASINS--L.A. Logan, River Basin Research Section, Ministry of the Environment, Toronto, Ont.

Objectives: To determine reliable estimates of basin-wide snowpack conditions (measured indices - depth, water equivalent, core length, density, albedo, etc.) for use in evaluating snowpack storage and yield, time delays to snowmelt runoff, and for general snowmelt hydrograph synthesis.

Recent Reports: (In preparation) Logan, L.A., Snow Survey Report, Wilmot Creek Basin: 1968-1969 to 1972-1973 Snow Season, Snow Survey Report - East and Middle Oakville Creeks Basin: 1969-1970 to 1972-1973 Snow Season.

- 74-15 MEAN SNOWPACK WATER EQUIVALENT MAPS AND SNOW COURSE NETWORK DESIGN PROBLEMS OVER SOUTHERN ONTARIO--H.L. Ferguson and B.E. Goodison, Atmospheric Environment Service, Downsview, Ontario.

Objectives: Mean snowpack water equivalent maps were prepared for Southern Ontario based on published snow course records. Analysis of the patterns, with consideration of exposure, land use, and topography suggested problems with the network design and resulted in recommendations for improvements.

Recent Reports: Paper to be presented at 1974 meeting of the Eastern Snow Conference.

- 74-16 A QUANTITATIVE ANALYSIS OF SNOW ABLATION IN A SOUTHERN ONTARIO DRAINAGE BASIN--B.E. Goodison, Atmospheric Environment Service, Downsview, Ontario. Co-ordinator: F.K. Hare, Univ. of Toronto, Toronto, Ontario.

Objectives: (1) To develop a better understanding of the snow accumulation - ablation process in the Cold Creek Basin, an area representative of the northern headwaters of the Lake Ontario basin, more specifically of the Humber River system. (2) To ascertain the energy relationship of winter snow ablation of a shallow Southern Ontario snowpack when winter ablation is high.

Data collection and analysis continues of relevant hydro-meteorological data. Extensive snow course measurements are being analyzed to obtain reliable estimates of basin wide snow water equivalent, allowing for consideration's of elevation and vegetation. Analysis of point melt rates as determined from a snowmelt index plot continues.

Recent Reports: No published reports - internal progress reports only.

- 74-17 SNOW SENSOR EVALUATION--A.J. Brown and Ned Peterson, Snow Surveys and Water Supply Forecasting Section, Div. of Resources Development, Department of Water Resources, Sacramento, California.

Objectives: A field evaluation approach to checking the performance of various instrumentation and peripheral devices, in order to perfect components for operational use in collecting snow water content and other meteorological data by telemetry for streamflow forecasting purposes.

The primary thrust of these continuing studies is in the area of snow sensors, as follows: Pressure sensing rubber

pillows of various sizes; pressure tanks of various thicknesses and surface areas; pressure transducers; radioactive gages using signal attenuation; effects of various installation techniques; associated accuracy studies; temperature regimes; snow physics, as related to snow sensor performance.

Recent Reports: Periodic dissemination of study results are made to cooperators in the California Cooperative Snow Surveys Program through a limited publication of memorandum reports.

74-18 MONITORING OF SNOW WATER EQUIVALENT BY RADIOLOGICAL SYSTEMS--
Vern C. Bissell and Eugene L. Peck, National Weather Service,
Silver Spring, Md.

Objectives: To develop techniques for the remote measurement of the water equivalent of the snowcover. The techniques that have been developed during the past four years were used in a research measurement program for the Lake Ontario Basin in conjunction with the IFYGL project. A final report on the snow reconnaissance project will be released by May 1974. Tests have continued on the ground based unit for measurement in small forest openings.

Recent Reports: (1) Bissell, Vernon C. and Peck, Eugene L., "Monitoring Snow Water Equivalent Using Natural Soil Radioactivity," Vol. 9, No. 4, Water Resources Research, 1973.

(2) Bissell, V.C. and E. L. Peck, "Measurement of Snow at a Remote Site: Natural Radioactivity Technique," Interdisciplinary Symposium on Advanced Concepts and Techniques in the Study of Snow and Ice Resources, December 2-6, 1973, Monterey, California.

(3) Bissell, Vernon C., "Natural Gamma Spectral Peak Method for Snow Measurement from Aircraft," Interdisciplinary Symposium on Advanced Concepts and Techniques in the Study of Snow and Ice Resources, December 2-6, 1973, Monterey, California.

(4) Peck, E. L., and Bissell, V.C., "Aerial Measurement of Snow Water Equivalent by Terrestrial Gamma Radiation Survey," Bull. International Assoc. Hydro Sciences, Vol. XVIII, No. 1,

(5) Peck, Eugene L., "Soil Moisture - A Critical Factor in Snowmelt Runoff?", presented at the Fifty-Fourth Annual Meeting of the American Geophysical Union, April 16-20, 1973, Washington, D.C.

74-19 NOAA - ARS COOPERATIVE SNOW HYDROLOGY PROJECT--Eric Anderson,

National Weather Service, Silver Spring, Md. and Ron Whipkey, ARS New England Watershed Research Center, South Burlington, Vt.

Objectives: To develop and test physically based techniques for estimating the metamorphosis and ablation of a snowpack. The project began in 1966. Data collection and analysis are continuing.

Recent Reports: The results of this project have not yet been published.

74-20 GROUND TRUE PRECIPITATION STUDIES--Lee W. Larson and Eugene L. Peck, Office of Hydrology, Hydrologic Research Laboratory, National Weather Service, Silver Spring, Md.

Objectives: The general objective is to improve precipitation measurements, especially for solid precipitation, by various techniques.

Recent Reports: (1) E.L. Peck, et al., Lake Ontario Snowfall Observational Network for Calibrating Radar Measurements, Symposium on Advanced Concepts in the Study of Snow and Ice Resources, US/IHD, Monterey, Calif., Dec. 1973.

(2) James W. Wilson, Measurement of Snowfall by Radar, Symposium, US/IHD, Monterey, Calif., Dec. 1973.

(3) Paul A. Rechard, et al., Measuring Snowfall, A Critical Factor for Snow Resources Management, Symposium, US/IHD, Monterey, Calif., Dec. 1973.

(4) Roy E. Brewer, Measurement of Solid Precipitation Under Windy Conditions, MS thesis, Dept. of Civil Eng., Univ. of Wyo., Laramie, May 1973.

(5) Paul A. Rechard, Winter Precipitation Gage Catch in Windy Mountainous Area, WMO Symposium, Geilo, Norway, August, 1972.

(6) E. L. Peck, Relation of Orographic Winter Precipitation Patterns to Meteorological Parameters, WMO Symposium, Geilo, Norway, August 1972.

74-21 SNOW AND AVALANCHES--P.A. Schaerer, Div. of Building Research, National Research Council Canada, Ottawa, Ontario K1A 0R6.

Objectives: To obtain the information required for making decisions concerning avalanche control projects, and for the design of avalanche defence structures and buildings in deep snow areas. To develop methods, instruments, critical values

necessary for avalanche hazard forecasting in western Canada.

Recent Reports: (1) 1972, P.A. Schaerer, "Control of snow drifting about buildings", Canadian Building Digest No. 146.

(2) 1972, P.A. Schaerer, "Terrain and vegetation of snow avalanche sites at Rogers Pass", In: Mountain Geomorphology, B.C. Geographical Series No. 14.

(3) 1972, P.A. Schaerer, "Observations of avalanche impact pressures", Proceedings of Second National Avalanche School 1972, U.S. Forest Service.

4. SNOWMELT

- 74-22 SNOWMELT RUNOFF FROM FORESTED WATERSHED IN NEW ENGLAND--
R.S. Pierce, C.A. Federer & J.W. Hornbeck, U.S.F.S., Durham,
N.H.

Objectives: Small gaged watersheds are being used to study the effects of aspect and forest practices on snowmelt runoff. Experimental treatments include a complete forest clearing and a strip cutting. Snow course data are being collected to supplement streamflow records.

Recent Reports: Federer, C. Anthony; Pierce, Robert S. and Hornbeck, James W. SNOW MANAGEMENT SEEMS UNLIKELY IN NORTHEASTERN FORESTS. Proc. 1973 Eastern Snow Conf. pp. 102-113.

- 74-23 SNOW MELTING SYSTEMS--G.P. Williams, Geotechnical Section,
Div. of Building Research, Nat. Research Council Canada,
Ottawa, Ontario K1A 0R6.

Objectives: To establish design criteria for embedded and above ground snow and ice melting systems.

Recent Reports: G.P. Williams, "Heat requirements of snow melting systems in Canada", prepared for presentation at First National Snow Conference, 16-18 April 1973, Ottawa.

5. STREAMFLOW

- 74-24 EVAPOTRANSPIRATION, RUN-OFF, STORAGE, AND DRAINAGE CHARACTERISTICS OF WATER FROM FOREST SOILS--Mader, D.L. and MacConnell, W.P., Dept. of Forestry & WLM, Univ. of Mass., Amherst, Mass.

Objectives: The study of streamflow, water color generation from still waters and thinning fertilization and growth of certain tree stands.

6. LAKE AND RIVER ICE

- 74-25 RIVER REGIME AT BREAK-UP--Bernard Michel, Ice Mechanics Lab, Dept. of Civil Eng., Universite Laval, Quebec.

Objectives: Even if the processes of break-up are rather well described in the literature there is little numerical data on maximum water levels and erosion action corresponding to various characteristics of jams. This question is studied with a scale model in the hydraulic laboratory where the solid ice cover is simulated with an artificial material having, to scale, the mechanical properties of ice. The first phase of the project deals with the characteristic of dynamic jams when the ice is unstable and moving. An extensive program is foreseen for this research.

Recent Reports: No recent report titles provided.

- 74-26 RHEOLOGICAL BEHAVIOR OF FRESH WATER ICE--Bernard Michel, Ice Mechanics Lab., Dept. of Civil Eng., Universite Laval, Quebec.

Objectives: The laboratory is pursuing its long term studies on the mechanical properties of river and lake ice. This year the program deals with data processing of small samples behavior in the ductile range. A general rheological model for various modes of deformation of ice is being tried.

Recent Reports: No recent report titles provided.

- 74-27 IMPACT OF ICE ON PIERS--Bernard Michel, Ice Mechanics Lab., Dept. of Civil Eng., Universite Laval, Quebec.

Objectives: Model ice having the properties of real ice in the brittle range is used at a scale of 1/50 to study modes of failure, form effects and contact coefficients for piles of different geometries.

Recent Reports: No recent report titles provided.

- 74-28 ANALYSIS AND DESIGN OF THERMAL PILES FOR COLD REGIONS-- Joseph M. O'Byrne, Mechanical & Aerospace Eng. Dept., Univ. of Mass., Amherst, Mass.

Objectives: Analytical work completed; proposal for experiments being prepared.

Recent Reports: Report IR 260, 1974

- 74-29 ICE FORMATION AND BREAK-UP--G.P. Williams, Geotechnical Section, Div. of Building Research, Nat. Res. Council Canada, Ottawa, Ontario K1A 0R6.

Objectives: To develop methods of predicting the formation, growth and break-up of river and lake ice for purposes of construction and transportation.

Recent Reports: 1973, G.P. Williams and D. MacKay, "Characteristics and Occurrence of Ice Jams in Canada", Proc. Seminar on Ice Jams, Snow & Ice Subcommittee, Assoc. Committee on Geotech. Research, National Research Council Canada, Ottawa.

7. HIGHWAYS AND BUILDINGS

74-30 ICE ENGINEERING--R. Frederking, Geotechnical Section, Div. of Building Research, Nat. Research Council Canada, Ottawa, Ontario K1A 0R6.

Objectives: To establish the criteria required for the design of structures subject to forces due to ice.

Recent Reports: (1) 1973, L.W. Gold, "Ice, a challenge to the engineer", Proc. 4th Can. Congress App. Mech., Ecole Polytechnique, Montreal.

(2) 1973, L.W. Gold, "Effect of ice on structures and navigation", General Rept. to Sect. II, Subj. 4, XXIII Int. Navigation Congress, Ottawa.

8. SOIL WATER AND FROST

74-31 SNOW HYDROLOGY-SOIL MOISTURE--W.N. Embree, U.S. Geol. Survey, Box 948, Albany, N.Y. 12201.

Objectives: To obtain an estimate of changes in quantity of water stored in the unsaturated zone and to better define the contribution of snowmelt to soil moisture through the use of neutron-scattering soil-moisture equipment.

Recent Reports: No recent report titles provided.