1. **Properties of Snow and Ice**

78-1  THE PHYSICS AND MECHANICS OF WET SNOW—S.C. Colbeck, U.S. Army Cold Regions Research and Engineering Laboratory, Hanover, NH.

Objectives: Investigate the physical properties, mechanical properties, and movement of water in wet snow. Seek application of the knowledge generated to the solution of engineering problems.


RETENTION AND TRANSMISSION OF LIQUID WATER IN FRESH SNOW—David R. DeWalle, The Pennsylvania State University, University Park, PA.

Objectives: Study nature of liquid water retention and transmission in fresh snow including determination of snowpack runoff lag time, liquid water holding capacity and routing coefficients. Study concluded March 1977.


WATER PERCOLATION WITHIN A DEEP SNOWPACK – FIELD INVESTIGATIONS AT A SITE ON MOUNT SEYMOUR, BRITISH COLUMBIA—Anthony Wankiewicz, Inland Waters Directorate, Environment Canada, Ottawa.

Objectives: Investigate percolation of melt water and irrigation water into deep ripe snowpacks with measured snow-water pressure, flux, and liquid water content changes. Results are discussed in terms of: 1. Water pressure regime in melting snowpacks, 2. Flux wave speed models, 3. Relation of pressure to flux in snow, 4. Construction of tensiometers for snow research, and 5. Principles of snow lysimeter construction. Study has been completed.


GLACIER HYDROLOGY—Dr. Gordon J. Young, Glaciology Division, Inlands Waters Directorate, Environment Canada, Ottawa.

Objectives: To assess the importance of glaciers on stream flow in glaciated areas. To investigate glacier response to climate. Progress is indicated in research reports (see below).


78-5

NOAA-ARS COOPERATIVE SNOW RESEARCH PROJECT--Dr. Eric Anderson, Hydrologic Research Laboratory, National Weather Service, NOAA, Silver Spring, MD and Dr. Harry Plonke, Director, Northeast Watershed Research Center, Agricultural Research Service, USDA, University Park, PA.

Objectives: To develop a better understanding of the physics of snowcover metamorphism and energy exchange. The focal point of this study is the NOAA-ARS Snow Research Station located near Danville, Vermont. Collection and analysis of data continues.


78-6

OPTICAL PROPERTIES OF SNOW AND ICE—W.A. Adams and P.A. Flavelle, Glaciology Division, Fisheries and Environment Canada, Ottawa.

Objectives: Complete analysis of field data on reflectance and transmission of solar radiation (400-750 nm) through lake ice in Ontario and N.W.T. and develop correlations with physical properties (field seasons, 1973-1977).


2. PRECIPITATION AND ACCUMULATION

78-7 HYDROMETEOROLOGIE, BASIN VERSANT DE LA SAINT-FRANCOIS — PROGRAMME DES CONNAISSANCES INTERIEURES (EA7) — M. Michel Ferland, Service de la Météorologie, Québec.

Objectives: The hydrometeorological study of the Saint-François river watershed. This study is part of an integrated hydrological study of the whole watershed.


78-8 INVESTIGATION OF PRECIPITATION CHEMISTRY DURING STORM EVENTS WITH RESPECT TO STORM ORIGINS—James W. Hornbeck and C. Wayne Martin, U.S. Forest Service, Northeast Forest Experiment Station, Durham, NH.

Objectives: To determine the source areas of ions that enter the Hubbard Brook ecosystem in precipitation. To determine the causes and sources of any seasonal patterns in ion concentrations in precipitation.


Objectives: Evaluate the impact of increased precipitation on streamflow runoff. Study is complete.


78-10 SNOW AND ICE PREDICTION IN WINTER ENVIRONMENTS—M. Bilello, U.S. Army Cold Regions Research and Engineering Laboratory, Hanover, NH.

Objectives: Provide a description of snow and ice conditions in Arctic and Subarctic regions and establish predictive techniques using climatic and meteorological information. Analogs and maps to depict various aspects of the winter environment throughout North America, Europe, and Asia are being developed.


(6) Bilello, M. "Analysis of the Mid-winter Regime of Snow Occurrence in Germany." In press.

NASHWAK EXPERIMENTAL WATERSHED (N.E.W.) PROJECT (HYDROMETEOROLOGICAL STUDIES--SNOW COVER)—R.B.B. Dickson, Department of Forest Resources, University of New Brunswick, Fredericton, N.B.

Objectives: Characterization of snow cover relationships for the N.E.W. Project area. Assessment of the effect of commercial clearcutting on snow cover distribution. Characterization study data collection is practically complete, clearcutting investigation is scheduled for 1973.


THE DEVELOPMENT OF AN OBJECTIVE FORECAST TECHNIQUE FOR PREDICTING THE INTENSITY OF LAKE-EFFECT SNOWSTORMS—Dr. Kenneth F. Dewey, University of Nebraska, Lincoln, NE.

Objectives: A statistical package based upon 10 years of lake-effect data was tested during the 1976-77 snowfall season. The results were satisfying and, after testing during the 1977-78 snowfall season, it is hoped that the National Weather Service will implement the forecast product for the 1978-79 winter.


Objectives: To assess the accuracy and comparability of Canadian snowfall precipitation measurements. To test new methods of measurement or modifications e.g. Wyoming shielded gauges at selected Canadian stations. Initial results have been analyzed for M.S.C. Nipher shielded snow gauge, Universal gauge, and Fischer and Porter.


Objectives: To analyse the effect of land use on snow cover in a Southern Ontario basin and to assess the comparability of accumulated snowfall and snow cover up to peak accumulation. Allowing for necessary corrections, the snowfall and snow cover measurements were shown to be comparable. Land use shows a definite relation with snow cover.

3. SNOWPACK MEASUREMENT

78-15 SNOW DISTRIBUTION AND STRATIGRAPHY IN THE PETERBOROUGH AREA, ONTARIO--W.P. Adams, Dean of Graduate Studies, Trent University, Peterborough, Ontario.

Objectives: Study of the evolution of spatial patterns of snowcover and of stratigraphy in various landscape units.


Objectives: (1) To test the accuracy and comparability of snow samplers used in Eastern North America in shallow snowpack environments. Results indicate over-measurement of 4-8%, very similar to that reported for western regions.

(2) To test new samplers for sampling shallow icy snowpacks e.g. McCall sampler.


78-17 ANNUAL MAXIMUM SNOW DEPTHS IN THE CONTIGUOUS UNITED STATES--R.K. Redfield and W.N. Tobiasson, U.S. Army Cold Regions Research and Engineering Laboratory, Hanover, NH.

Objectives: Compile and statistically analyze the series of annual maximum snow depths for National Weather Service stations in the contiguous United States. Data for over 9000 stations are available. The report will present in tabular form maximum, minimum, mean, and return period values for each station.

Recent Reports: Report is due in 1978.

4. SNOWMELT

78-18 DEVELOPMENT OF SNOW - WATER INPUT - FROST MODELS FOR THE NORTHEAST--Robert L. Hendrick and George R. Benoit, Northeast Watershed Research Center, USDA, ARS, University Park, PA.

Objectives: To refine and improve a snow accumulation, melt, and water input model which requires only ordinary weather station data as input and which produces point or watershed estimates of snow and water input. A soil freezing and thawing model based on the same inputs is also under development. Current efforts are the development of elevation effects on precipitation, snow, and water input and the retention of rainfall in snowpacks.


Objectives: Investigate the effect of frozen ground on infiltration into the soil and conditions of lateral flow along the base of the snowpack. Installation of soil temperature probes in several Canadian research basins commencing with Perch Lake (Chalk River, Ontario).

Recent Reports: None.


Recent Reports: Only internal documentation to date.

5. STREAMFLOW


Recent Reports: Only internal documentation to date.

6. LAKE AND RIVER ICE

78-22 ANALYSIS ON DECAY OF LAKE, RIVER, AND SEA ICE—M. Bilello, U.S. Army Cold Regions Research and Engineering Laboratory, Hanover, NH.

Objectives: Provide a description of ice decay conditions in Arctic and Subarctic regions and establish predictive techniques using climatic and meteorological information.


Objectives: Study of the development of spatial and stratigraphic patterns in ice and snow on lakes with reference to biological and other implications of those patterns.


Objectives: Production of a map showing location and dates of all known ice jams. Narrative on ice movement and effect on flood forecasting.

Recent Reports: None.

FRAZIL ICE NUCLEATION—Dr. Bernard Michel, University Laval, Quebec.

Objectives: Determine the supercooling required to nucleate frazil ice and discuss nucleation mechanisms.


7. HIGHWAYS AND BUILDINGS

ROOF SNOW LOAD CASE HISTORIES—1977-78—Professor M. O'Rourke, Rensselaer Polytechnic Institute, Troy, NY.

Objectives: To generate roof snow load case histories during the 1977-78 winter and to use this information to develop recommendations for converting ground snow loads to roof snow loads for structural design purposes.


SNOW LOADS ON MOBILE HOMES IN CANADA: A PILOT STUDY—Dr. Don A. Taylor, Division of Building Research, National Research Council of Canada, Ottawa.

Objectives: To provide design snowloads on mobile homes: to determine if they are different from other roofs. Five year pilot study—1977-78 is the fourth year.

Recent Reports: None yet.

THE EFFECT OF ROOF SLOPE AND TEXTURE ON SNOW LOADS ON SHELTERED ROOFS: A PILOT STUDY—Dr. Don A. Taylor, Division of Building Research, National Research Council of Canada, Ottawa.

Objective: To provide data for a re-examination of the slope/reduction relationship currently used in the commentary on snowloads in the 1977 National Building Code of Canada. Five year pilot study—1977-78 is the fourth year.

Recent Reports: None yet.

SNOW LOADS ON ARENA-TYPE STRUCTURES IN CANADA—Dr. Don A. Taylor, Division of Building Research, National Research Council of Canada, Ottawa.
Objectives: To correlate data on arena-type structures to provide better back-
ground for the National Building Code design loads on these structures.

type roofs in Canada." Presented to Canadian Society for Civil Engineering,
Ontario Region Seminar on "Restoration of Existing Buildings - Arenas." 24

78-30
A STUDY OF SNOW ON FLAT AND MULTI-LEVEL FLAT ROOFS IN CANADA—Dr. Don A. Taylor,
Division of Building Research, National Research Council of Canada, Ottawa.

Objectives: Survey is being conducted at 5 locations across Canada to get
statistical data on flat roofs and on drifts where the roofs change levels.
Survey is in its 11th year in 1977-78 and is continuing.

Recent Reports: None yet.

78-31
SNOW LOADS ON CYLINDRICAL ARCH-SHAPED ROOFS IN CANADA—Dr. Don A. Taylor, Divi-
sion of Building Research, National Research Council of Canada, Ottawa.

Objectives: To obtain better snow distributions for the design of cylindrical
arch-shaped roofs. Study continuing.

Recent Reports: Paper in draft stage.

78-32
THE DENSITY OF SNOW ON ROOFS—Dr. Don A. Taylor, Division of Building Research,
National Research Council of Canada, Ottawa.

Objectives: To collect data on densities from the last 20 years, analyze it
statistically and use it at various locations across Canada to convert depth
measurements reliably to loads. Also to provide a better design density figure
measurements continuing.


78-33
SNOW LOADS FOR THE CONTIGUOUS UNITED STATES—R.K. Redfield and W.N. Tobinsson,
U.S. Army Cold Regions Research and Engineering Laboratory, Hanover, NH.

Objectives: (1) Statistically analyze available series of maximum annual snow
depths and apply regionally developed densities to generate return period ground
snow loads for each location.

(2) Develop ground-to-roof conversion factors by studying the relationship of
ground and roof snow loads in different areas of the United States.

Recent Reports: Interim reports due in 1978.

8. SOIL AND WATER FROST

No submissions.

9. REMOTE SENSING

78-34
SNOW COVER ANALYSIS IN NEW ENGLAND USING LANDSAT DIGITAL DATA—Carolyn J. Merry
and Dr. Harlan L. McKim, U.S. Army Cold Regions Research and Engineering Lab-
oratory, Hanover, NH.
Objectives: To synoptically map snow cover and the water equivalent of the snowpack using Landsat digital data. Site selection based on vegetation, slope, aspect, and elevation has been accomplished in the Dickey-Lincoln School Lakes project area, Maine. Ground truth measurements of snow depth and water equivalent at the selected sites will be taken in conjunction with times of the Landsat imagery acquisition during the 1977-78 winter season. Cloud-free Landsat COT's will also be obtained over the Sleepers River Watershed in Danville, Vermont for the 1972 through 1977 winter seasons. Detailed measurements of the snow cover at this site are available from December 1968 to present.


78-35 SATELLITE SNOW COVER EVALUATION—J.N. Wachichak, Soil Conservation Service, Denver, CO.

Objectives: Determine if images from satellite pictures can pin-point total snow cover in an area and determine if snow cover can be used as a parameter in forecasting flows. Also determine how much improvement can be expected.

Recent Reports: Three annual reports are available.


Objectives: Research involving microwave characteristics of snow was undertaken in order to expand the information content currently available from remote sensing, namely the measurement of snow-covered area. Initial results indicate that it is possible to distinguish between ranges of snow depth in a dry snow condition and to subsequently detect the onset of liquid water in the same snowpack using multifrequency microwave data. Longer wave lengths can be used to assess the condition of the underlying soil. Ultimately, it may be possible to estimate snow volume over large areas using calibrated TB and in turn improve snow melt runoff predictions.


78-37 DETERMINATION OF THE EXTENT OF SNOWCOVER IN HEAVILY FORESTED MOUNTAINS USING NOAA-4 IMAGERY—A.R. Eschner and T. Lillesand, SUNY College of Environmental Science and Forestry, Syracuse, NY.

Objectives: To assess the potential for mapping snow extent from NOAA imagery in the Adirondack Mountains, including a quantitative consideration of masking effects. A detailed analysis of snow reflectance under vegetative cover; and experimental mapping of snow extent.


Objectives: (1) To improve or develop methods for mapping the extent, depth, density, temperature, and condition of snow cover from Earth Satellite data; (2) To explore relation of satellite-determined snow cover to seasonal stream flow; (3) To develop methods from monitoring seasonal fluctuations of ice cover on large rivers; (4) To monitor Great Lakes ice-cover during winter months using NOAA-VHRR Visible and Infrared as well as GOES VISIR Visible Imagery.


Objectives: To study large-scale snowcover variations in relation to climate dynamics.


Objectives: Determine current and potential role of satellite data in operational snow management programs. Project is currently in the third year of a four year effort.

Recent Reports: (1) Progress reports are available from A. Rengo, NASA/GSFC, Code 913, Greenbelt, MD.
