

EASTERN SNOW CONFERENCE

Report of the

COMMITTEE ON RESEARCH

February 1967

This report lists research reports relating to snow and ice as revealed by a poll of current members of the Conference.

The outline of the report is as follows:

SECTION I - SUMMARY OF CURRENT PROJECTS

A - Projects not reported in 1966

B - Projects reported in 1966

C - Research Projects Indirectly Related to Snow and Ice.

SECTION II - SUPPLEMENTAL INFORMATION

DATA SOURCES

Respectfully submitted,
Committee on Research, ESC

David R. Campbell, Chairman
Llew L. Cross
Claude Triquet

SECTION I - CURRENT SNOW RESEARCH

GROUP A - NEW PROJECTS

- 67A1 WATER BALANCE STUDIES IN LABRADOR-UNGAVA
B. F. Findlay, McGill Sub-Arctic Research Laboratory, Box 790,
Schefferville, Quebec

An accurate determination of the nature and quantity of the hydrologic variables in a sub-arctic region. Particular attention is being paid toward an accurate measurement of precipitation. Snowfall is especially important in this area. Use is being made of standard, recording, and totalizing gauges. Snow Surveys are carried out annually in a research watershed, and weekly in a regional snow course. Snow evaporation and melt are studied and related to runoff and meteorological factors. The usefulness of a snow pillow is being evaluated.

Papers: Snow Measurement in the Vicinity of Knob Lake, Central Labrador-Ungava, Winter 1964-1965 by W. P. Adams and B. F. Findlay. Proc. Eastern Snow Conference 1966 pp 26-40

A Hydrologic Study in the Knob Lake Area, New Quebec, 1966 by B. F. Findlay McGill Sub-Arctic Research Papers #21 pp 144-162

The Water Budget of the Knob Lake Area: A Hydrologic Study in Central Labrador-Ungava by B. F. Findlay, M. Sc. Thesis - McGill University 1966 also M.S.A.R.P. #22 pp 1-95

Snowfall and Snow Cover at Knob Lake, Central Labrador-Ungava by W.P. Adams, W. R. Cowan, B. F. Findlay, J. S. Gardner and R. J. Rogerson, M.S.A.R.P. #22.

Snow Survey at Schefferville 1964-1965 by W. R. Cowan, M.S.A.R.P. No. 21, 1966 pp 135-143.

- 67A2 GAUGE CATCHES OF SNOW UNDER VARIOUS CONDITIONS OF EXPOSURE
Livingston Lansing, R.D. 2, Jackson Hill, Boonville, N.Y.

To determine best location of rain gauges, with a view to obtaining correct catchment.

State University of New York, ASRC Field Station, Boonville, N.Y.

Paper: Radar Characteristics of Lake Effect Storms (Snow) by R.L. Peace, Jr., obtainable from Cornell Aeronautical Laboratory Inc., Buffalo, N.Y. (See also 67A3)

- 67A3 LAKE ONTARIO - OSWEGO AREA - LAKE WEATHER PHENOMENA - SNOW
Robert B. Sykes, Jr., State University College at Oswego, Oswego, N.Y.
(ASRC affiliation)

To trace oscillating zones of change in respect to wind and pressure changes plus cloud relationships.

Paper: Mesoscale Study of a Lake Effect Snow Storm by R.L. Peace, Jr. and R.B. Sykes, Jr. Monthly Weather Review August, 1966, obtainable from State University of New York ASRC, Albany.

- 67A4 A SYNOPTIC CLIMATOLOGY OF HEAVY SNOWSTORMS FOR NEW JERSEY
William B. Hovey, Meteorology Department, Belknap College, Center Harbor, New Hampshire.

The frequency of heavy snowstorms that affected the New Jersey area in a fifteen winter period (1949 through 1964) is examined and the prevailing synoptic situations evaluated. Six "types" of storms, based on area of cyclogenesis and subsequent tracks, are discussed. A complete climatology of the heavy snowstorms is presented including the areal and temporal distribution.

Department of Meteorology, College of Agriculture, Rutgers - The State University, New Brunswick, N.J.

Paper: A Synoptic Climatology of Heavy Snowstorms for New Jersey by William B. Hovey and Mark D. Shulman, THE BULLETIN, New Jersey Academy of Science, Vol. 10, No. 2, Fall, 1965.

- 67A5 NORTH NASHWAKSIS REPRESENTATIVE BASIN RESEARCH STUDIES
Dr. Kersi S. Savar (Prof. D.I. Bray, Assisting Coordinator)

1. Differential and integral budgeting for a representative basin in New Brunswick -- North Nashwaksis watershed.

2. A field determination of the quantity and time distribution of snowmelt at a point and correlations with controlling meteorological parameters.

Department of Civil Engineering, University of New Brunswick, Fredericton, N.B., Canada.

Paper: Correlation of Snowmelt with the Controlling Meteorological Parameters. M. Sc. Thesis, Civil Engineering Library, University of New Brunswick. (Limited copies available at cost of copying - approx. \$10-15.)

- 67A6 SNOWFALL FREQUENCIES AND SNOWCOVER DATA
Robert E. Lautzenheizer, ESSA - Weather Bureau State Climatologist,
1000 U.S. Custom House, Boston, Massachusetts 02109

To tabulate frequencies of daily snowfalls of 1, 2, 3 or more inches by months and seasons for periods of record up to about 30 years. Also tabulate beginning and end of snowcover of 1 inch or more continuously for any extended period for the longest such period in the season. For those seasons with an extended cover, calculate the average date of beginning and ending. Calculate the average seasonal maximum depth of snow cover and the average date of the maximum cover. Tabulations made for various stations in Massachusetts and northern New England. Eventual goal: A bulletin for the area when sufficient stations have been completed.

Papers: Initial publication on individual station basis in the series, Substation Climatological Summaries, Climatology of the U.S. No. 20, available from above address. Recent stations added: Farmington, Maine; Stockbridge, Massachusetts; Benton and Lakeport, New Hampshire; and Bennington and West Burke, Vermont.

- 67A7 SNOW COVER DISTRIBUTION AS MAPPED FROM SATELLITE PHOTOGRAPHY
James C. Barnes, Allied Research Associates, Virginia Road, Concord,
Massachusetts 01742.

Research was conducted under contract with the Weather Bureau - Office of Hydrology and the National Environmental Satellite Center (of ESSA). Satellite photographs from three winter seasons were analyzed to determine if snow cover distributions in the flat terrain of the Missouri and upper Mississippi river basin area could be usefully mapped from satellite photography. Results indicate that the satellite can provide operationally useful information to the hydrologist.

Paper: Final Report can be obtained from Allied Research Associates, Inc.

- 67A8 PROJECT "WEATHERCORD"
Bernard A. Power, Weather Engineering Corporation of Canada, Ltd.,
313 Dorval Avenue, Dorval, P.Q., Canada.

To test the effectiveness of a new high-output explosive cloud seeding device (WEATHERCORD) in modifying super cooled atmospheric clouds with a view to increasing snowfall and rainfall.

- 67A9 SCALE MODEL STUDIES OF A SECTION OF THE CHAUDIERE RIVER, NEAR BEAUCEVILLE
Claude Triquet, Eng. M. Sc. (with Dr. B. Michel as consultant) Dept. of
Natural Resources, Quebec

A series of tests on a scale model are made to determine the design characteristics of an ice-retaining construction consisting of an ice-boom and submerged weir, the purpose of the structure being to delay the passage of ice downstream during the break-up period thus allowing the downstream section to free itself from ice.

Conducted at Laval University, Faculty of Sciences, Cité Universitaire, Ste. Foy, Quebec, by The Department of Natural Resources, 1640 Boul. de L'Entente, Ch. 106, Quebec.

Paper: Reports not completed. Obtainable later at Department of National Resources (address above).

- 67A10 ETUDES CRYOLOGIQUES SUR LES DEBACLES EN RIVIERE
Bernard Mathieu, Eng. M.Sc., Department of Natural Resources, Quebec.

A series of laboratory tests were conducted to analyze the start and evolution of ice jam formation in rivers during the break-up period in order to confirm the accuracy of a theory elaborated by B. Michel on the subject.

Conducted at Laval University, Faculty of Sciences, Cité Universitaire, Ste. Foy, Quebec, by the Department of Natural Resources, 1640 Boul. de L'Entente, Ch. 106, Quebec.

Paper: Internal report to be published. Obtainable at Dept. of National Resources (address above).

- 67A11-67A18 All Meteorological Branch, Department of Transport, 315 Bloor St. West, Toronto 5, Canada.

- 67A11 MAGNITUDE AND FREQUENCY OF PRAIRIE SNOWPACK ACCUMULATION
Meteorological Branch, Department of Transport.

To study the magnitude and frequency of the snowpack accumulation on the Canadian Prairies to provide values which will be useful in water supply design or in predicting runoff.

Paper: Under preparation by G. A. McKay.

67A12 FORECASTING FREEZE-UP ON THE ST. LAWRENCE SEAWAY
Meteorologic Branch, Department of Transport

A study of air temperatures in the St. Lawrence River Valley in relation to dates of freeze-up at Cornwall and Montreal has resulted in a semi-empirical method of calculating the date of freeze-up. Forecasts of air temperatures can be used to predict freeze-up dates.

Paper: This paper, by W. E. Markham is currently in press in the T.E.C. circular series, Canada, Department of Transport, Meteorological Branch.

67A13 SNOW COVER IN CANADA
Meteorological Branch, Department of Transport

This study contains a description, tabular data, maps and frequency diagrams of the duration and depth of snow cover in Canada based on 20 winters.

Paper: Snow Cover by J. G. Potter, Climatological Studies No. 3, 1966, Canada, Department of Transport, Meteorological Branch.

67A14 SURFACE TEMPERATURES AND ICE FORMATION IN NORTHERN LAKES
Meteorological Branch, Department of Transport

By means of aircraft flights with an airborne radiation thermometer, surface water temperatures and ice cover on a number of northern Ontario lakes are being evaluated to aid in estimating freeze-up and break-up, evaporation and water volumes of the lakes.

67A15 EVALUATION OF WEATHER SATELLITE DATA FOR HYDROLOGICAL PURPOSES (SNOW AND ICE)
Meteorological Branch (IHD) Department of Transport

To evaluate the use of weather satellite data for determining snow and ice cover in Canada.

67A16 SEVERE ICE STORMS IN NEWFOUNDLAND
Meteorological Branch, Department of Transport

The study was carried out with a view to finding the frequency of occurrence of freezing rain, the prevailing wind directions and speed associated with freezing rain and the temperatures normally occurring with the phenomenon.

Paper: Severe Ice Storms in Newfoundland by A.W. Colt, CIR-4415, TEC-613, 18, 1966, Canada, Department of Transport, Meteorological Branch.

67A17 ON THE GROWTH OF FRESH WATER ICE
Meteorological Branch, Department of Transport

Stefan's equation for ice accretion has been modified to take into account the effects of snow depth and density. For regions in the Canadian Arctic the modified equation, when applied in the presence of a light snow cover with climatic estimates of heat loss, gives a satisfactory explanation of the observed ice growth.

Paper: This paper by D. Leahey has been submitted for publication.

67A18 STUDY OF ICE FORMATION ON THE NIAGARA RIVER
Meteorological Branch, Department of Transport

The problems posed to hydro-electric power plants by ice movements in the upper Niagara River are outlined and origins of the ice explored. Descriptions of the instruments chosen and the type of installations used are given for a project designed to measure all factors of the energy balance of the river and relate meteorological parameters to ice formation. A continuing program.

Paper: Instrumentation for Study of Ice Formation on the Niagara River, by H. F. Cork and R. G. Chapil - CIR 4496 - TEC 627, 1966, Canada, Department of Transport, Meteorological Branch.

67A19 SNOW RESEARCH AT SLEEPERS RIVER WATERSHED NEAR DANVILLE, VERMONT
Office of Hydrology, U.S. Weather Bureau, ESSA, Silver Spring, Md. 20910
W. T. Wilson, Chief, Technical Information Branch (in cooperation with ARS)

A meteorological station will be established to measure the meteorological factors involved in the energy budget of snow melt.

67A20 RESEARCH ON SNOW PILLOWS AT TWIN LAKES IN THE AMERICAN RIVER BASIN
Sacramento RFC, in corporation with California Department of Water Resources. For details see Office of Hydrology, ESSA. See 67A19 for address.

The pressure of the snowpack on the liquid-filled pillow is measured to determine the water equivalent of the snowpack.

67A21 SNOW INTERCEPTION BY CONIFEROUS TREE CROWNS
Arthur R. Eschner, S.U.N.Y. College of Forestry, Syracuse, N.Y. 13210

To determine the quantity of snow intercepted by individual crowns of coniferous species and its disposition under the climatic conditions of central New York. This will provide information for a rational approach to the role of snow in winter moisture and energy balances in forests.

67A21 SNOW INTERCEPTION BY CONIFEROUS TREE CROWNS - Continued

Papers: Land Use, Snow, and Stream Flow Regimen in Central New York by D.R. Satterlund and A.R. Eschner, Water Resources Research 1 (3) pp 397-405, 1965. The Surface Geometry of a Closed Conifer Forest in Relation to Losses of Intercepted Snow. U.S. Forest Service Research Paper NE-34, 1965.

Papers available from authors.

67A22 FRACTURE OF ICE

L.W. Gold, Division of Building Research, National Research Council, Ottawa, Ontario.

To determine the dependence of crack formation in ice, and the occurrence of failure, on stress, temperature and time.

Papers: The Cracking Activity in Ice during Creep by L.W. Gold, Canadian Journal of Physics, Vol. 38, No. 9, Sept., 1960, pp 1137-1148 (DBR Research Paper No. 103)

Formation of Cracks in Ice Plates by Thermal Shock, by L.W. Gold, Nature, Vol. 192 No. 4798, Oct. 14, 1961, pp 130-131. (DBR Research Paper No. 135)

67A23 THERMAL REGIME OF RIVER ICE

G.P. Williams, Div. of Building Research, National Research Council, Ottawa, Ontario.

To study ice formation in rivers, particularly supercooling and the relation of ice formation to meteorological variables. Progress includes continuation of special observations on supercooling in rivers and commencement of review of the literature on river ice; particularly ice jams and relationships between various types of ice jams and meteorological variables.

Paper: Adhesion of Ice to Underwater Structures, by G.P. Williams to be presented to 1967 Annual Meeting of Eastern Snow Conference.

67A24 SIZE OF AVALANCHES

P.A. Schaerer, Div. of Building Research, National Research Council, Ottawa, Ontario

To determine the dependence of the size of avalanches at a given site, and the amount of snow brought down each winter, on size of the accumulation zone and amount of snowfall.

Paper: A study of the Amount of Snow Deposited at Avalanche Sites, by P.A. Schaerer, presented to Int. Conf. on Low Temperature Science, Sapporo, Japan, 1966.

67A25 PLASTIC DEFORMATION OF ICE
A.S. Krausz, Div. of Building Research, National Research Council,
Ottawa, Ontario.

To obtain information on the mechanism of plastic deformation. The plastic behavior of ice is studied using the rate process theory and the Gilman-Johnston model. Attention is focused on the initial stage. It was established that in ice single crystals the dislocation multiplication process is the rate controlling mechanism in the initial stage.

Papers: Etching Technique to Study Plastic Deformation of Ice, by A.S. Krausz, The Journal of Glaciology, Vol. 3, No. 30, pp. 1003-1005, Oct. 1961.

The Creep of Ice in Bending, by A.S. Krausz, Canadian Journal of Physics, Vol. 41, No. 1, p 167, 1963.

On the Mechanism of the Initial Plastic Deformation of Ice, by A.S. Krausz, to be published.

67A26 ICING ON ENGINEERING STRUCTURES
Donald W. Boyd, Div. of Building Research, National Research Council,
Ottawa, Ontario

To determine the geographical distribution, frequency and thickness of ice accumulations on wires, towers and other structures. The Canadian Standards Association and many electric power and communication organizations are cooperating by reporting serious icing storms.

Papers: Icing Observations 1964-65, by D.W. Boyd, Division of Building Research, Technical Note 459, September, 1965.

Second report submitted for publication.

67A27 MATHEMATICAL MODEL OF A SNOWMELT FLOOD
Marcel Roche and Michel Slivitzky, Waters Branch, Quebec Department of Natural Resources, Parliament Building, Quebec City. (In cooperation with "Office de la Recherche Scientifique et Technique d'Outre-Mer" - Paris".)

To reproduce the daily flows of a snowmelt flood by means of a mathematical model. The following data are required for the processing of the model: physical characteristics of the watershed, daily temps. and precips., the water equivalent of the snow pack at the beginning of the freshet period. Parameters used for adjustment of the model are: temperature index, melting rate, runoff coefficient, rate of initial losses, coefficient for the reduction of the snow pack, routing function, the baseflow and its rate of growth.

Paper: First Report to be published in French in early 1967.

67A28 to 67A38 All U.S. Army Cold Regions
Research and Engineering Laboratory (CRREL) Hanover, N.H. 03755

67A28 STUDY OF FOOTING FOUNDATIONS AND CIVIL ENGINEERING STRUCTURES ON POLAR
SNOW
Sherwood C. Reed.

Develop suitable criteria for the design construction and performance
evaluation of footing foundations on polar snow and ice.

Paper: Spread Footing Foundations on Snow Tech. Report 175, CRREL.

67A29 ENGINEERING AND CONSTRUCTION PROPERTIES OF POLAR SNOW
R. Waterhouse and W. Tobiasson

Investigate engineering characteristics of polar snow and develop
design and construction criteria relating to the use of snow as a
construction material.

67A30 DEPOSITION AND EROSION OF SNOW BY THE WIND
U. Radok

The theories of uniform and nonuniform drifting snow are summarized
and the latter is extended by the derivation of an approximate relation
for the drift transport as function of the wind velocity.

Paper: Research Report 230, CRREL.

67A31 ROLE OF SINTERING IN SNOW CONSTRUCTION
Rene O. Ramseier

The mechanism of sintering and the effect of compaction on snow is
discussed. Examples of possible snow runway construction using pro-
cessed snow are given. From theory and the examples discussed, it is
concluded that snow runways can be constructed capable of handling
large aircraft in any polar or temperate region with enough snow and
temperature below the melting point for a sustained period.

Paper: Research Report 214, CRREL.

67A32 STRATIGRAPHIC ANALYSIS OF A DEEP ICE CORE FROM GREENLAND
Chester C. Langway, Jr.

A deep rotary core drilling project in 1957 at Site 2 on the
Greenland Ice Sheet provided ice core to a depth of 411 M. The
vertical variation in bulk density, microscopic structure, oxygen
isotope ratios, ionic constituents and extra terrestrial dust were
analyzed using both field and laboratory techniques. These data
permit the direct estimate of annual accumulation layers in the core.

Paper: Tech. Report 76, CRREL.

- 67A33 THE SINTERING PROCESS IN SNOW
Rene O. Ramseier and Charles M. Keeler

The growth of bonds between snow grains or ice spheres has been variously attributed to surface diffusion, volume diffusion and evaporation - condensation. This study suggests that evaporation-condensation must be the major mechanism of mass transport in snow under atmospheric conditions.

Paper: Research Report 226, CRREL

- 67A34 SIMULATION OF DRIFTING SNOW
Fuat Odar

Scale factors which are based on geometric, kinematic and dynamic similarity requirements are derived in order to simulate drifting snow in a wind tunnel.

Paper: Research Report 174, CRREL.

- 67A35 AN APPROACH TO THE CONSOLIDATION OF SNOW
E.D. Feldt and G.E.H. Ballard

A consolidation theory is developed for an age-hardened snow under uniaxial stress in the porosity range of 35 to 55 percent by considering one mechanism, viz., viscous flow of interparticle bonds.

Paper: Research Report 181, CRREL.

- 67A36 PRINCIPLES OF FROST HEAVING
Shunsuke Takagi.

An analysis is given of factors governing ice lens formation.

Paper: Research Report 140, CRREL.

- 67A37 HEAT TRANSFER CHARACTERISTICS OF NATURALLY COMPACTED SNOW
Yin-Chao Yen

The heat transfer characteristics of naturally compacted snow have been determined experimentally and are given.

Paper: Research Report 166, CRREL.

- 67A38 STRENGTH STUDIES OF SNOW
Malcolm Mellor and James H. Smith

Strength measurements were made on some 650 samples of homogeneous snow prepared under controlled conditions, primarily to investigate the effect of temperature variations.

Paper: Research Report 168, CRREL.

GROUP B - PROJECTS LISTED PREVIOUSLY

67B1 FORMATION OF ICE COVERS AND ICE JAMS IN RIVERS

E. Pariset, R. Hausser and A. Gagnon,
Lasalle Hydraulic Laboratory Ltd., 0250
St. Patrick St., LaSalle, Quebec

Theoretical work and model techniques applied to a study of the St. Lawrence River near Montreal and the site of Expo 67, The Montreal World Exhibition.

Paper: In preparation for publication by The American Society of Civil Engineers.

67B2 HYDROLOGIC ANALYSIS METHODS

Henry W. Anderson, Pacific SW Forest and Range Expt. Station,
P.O. Box 245, 1960 Addison St., Berkeley, California 94701

To develop, test and illustrate methods of hydrologic analysis suitable for discovering and evaluating (1) hydrologic processes of water and sediment production in forest, range and brushland watersheds; and (2) the relationship between the action of hydrologic processes at the sources and the downstream delivery of water yield, sedimentation and floods.

Papers: (1) Snow Accumulation and Melt in Relation to Terrain in Wet and Dry Years by Henry W. Anderson and Allan J. West, Proc. 33rd West. Snow Conference 1965. (2) Multivariate Methods of Hydrology. A Comparison Using Data of Known Functional Relationship, by James R. Wallis, Water Resources Research 4(1) pp 48-59, 1965. (3) Integrating Snow Management with Basin Management by Henry W. Anderson, to be published in Western Resources Symposium, John Wiley & Sons, N. Y. 1965. (4) Watershed Modeling Approach to Evaluation of The Hydrologic Potential of Unit Areas, by Henry W. Anderson, Proc. Forest Hydrology Symposium, pp 735-746, Pergamon Press Ltd., 1965.

67B3 SNOW SURVEYS IN NOVA SCOTIA

J.E. Peters, P.O. Box 365, Halifax, N.S.

Collection of snow data in the province, chiefly to get data for studies on the effect of snowmelt on floods.

Papers: Included in Snow Cover Data, Canada, Department of Transport (See Section II Data Sources)

- 67B4 INFLUENCE OF SURFACE CONDITIONS ON THE GROUND THERMAL REGIME
L.W. Gold, Div. of Building Research, National Research Council,
Ottawa, Ontario ;

To determine the influence of surface characteristics on the dependence of the ground thermal regime on meteorological factors.

Papers: Influence of Snow Cover on Heat Flow from the Ground, by L.W. Gold, Assoc. Internationale d'Hydrologie Scientifique, Union Geodesique et Geophysique Internationale, Assemblee Generale de Toronto 1957, Gentbrugge 1958, Tome IV, pp 13-21. (DBR Research Paper No. 63)

Analysis of Annual Variations in Ground Temperature at an Ottawa Site, by L.W. Gold, Canadian Journal of Earth Sciences Vol. 1, No. 2, 1964 pp 146-157. (DBR Research Paper No. 230)

- 67B5 MELTING OF LAKE ICE
G.P. Williams, Div. of Building Research, National Research Council,
Ottawa, Ontario

To study physical process of ice-melting and correlate rate of lake ice melt with meteorological conditions. Assess usefulness of dusts for increasing ice-melting rate.

Papers: Ice Dusting Experiments to Increase the Rate of Melting of Ice, by G.P. Williams, to be available shortly.

Correlating Freeze-up and Break-up with Weather Conditions, by G.P. Williams, Canadian Geotechnical Journal, Vol. II, No. 4, November, 1965.

- 67B6 CONTROL OF SNOW AND ICE
L.D. Minsk, USA, CRREL

Investigation of methods of removing or controlling snow and ice accumulation on pavements and structures.

Paper: Snow Removal and Ice Control, Tech. Report 128, CRREL.

- 67B7 SNOW AND ICE COVER INVESTIGATIONS
M.A. Billelo, USA CRREL

Conduct studies on regional variations in snow cover properties and on the formation, growth and decay of lake, river and sea ice in the Arctic, Subarctic and Temperate Zones. Investigate the seasonal and areal distribution of these conditions and develop forecast schemes for prediction of the time of occurrence.

Papers: Relationships between Climate and Regional Variations in Snow Cover Density in North America.

Changes in Water Temperature in a Shallow Lake in a Temperate Region during Ice Formation, Growth and Decay. Research Report 123. Ice Thickness Observations, North America Arctic and Subarctic, 1962-63 and 1963-64. Special Report 43, Part IV All CRREL.

GROUP C - RESEARCH INDIRECTLY RELATED TO SNOW AND ICE

- 67C1 MANS ENVIRONMENT: A STUDY FROM SPACE
Dr. J. Kuettner, Chief Space Scientist, ESSA
Rockville, Maryland. (Conducted at National
Environmental Satellite Center.)

A summary of ESSA requirements for manned space platform observations. One section discusses requirements for hydrologic data of a type which could possibly be acquired from orbiting spacecraft.

Paper: Report expected to be available after November, 1966 possibly with limited distribution.

- 67C2 STUDED TIRES
Highway Research Board. (Conducted at Cornell University)

A report on the advantages and disadvantages of the use of studded tires.

Paper: Highway Research Board Bulletin No. 136.

- 67C3 FLOOD RUNOFF REDUCTION AND WATER YIELD IMPROVEMENT FROM THE GLACIATED MOUNTAIN AREAS OF NEW ENGLAND
R.S. Pierce, Northeastern Forest Experiment Station, U.S. Forest Service, P.O. Box 640, Durham, N.H. 03824

The quantitative influence of forest environment and associated climate features on streamflow are being investigated. Reduction of high snowmelt runoff and increases in summer streamflow by suitable watershed treatments are the goals of the project.

Papers: Papers on stream gaging, snow accumulation and melt, and soil frost available from above address.

- 67C4 BAY D'ESPOIR - NEWFOUNDLAND
ShawMont Newfoundland Limited, (Conducted at Shawinigan Engineering Co. Ltd., 620 Dorchester Boulevard West, Montreal 2, Quebec

A procedure was developed to estimate the volume, the peak flow and the timing of the peak flow to assist in the design of cofferdams and the control of the spring flows at a power plant under construction.

Paper: Report available from The Newfoundland & Labrador Power Commission, St. John's, Newfoundland.

67C5 DETERMINATION OF THE WATER BALANCE OF FLATLAND AREAS IN SOUTHERN QUEBEC

Robert S. Broughton, Department of Agricultural Engineering
MacDonald College, P.Q. Canada

To measure the several components of water supply, runoff, runoff, seepage and evapotranspiration on plots in flat cropland areas in Southwestern Quebec having both tile drain and surface runoffs.

67C6 RIVER FORECASTING

U.S. Weather Bureau, ESSA, Silver Springs Maryland 20910

Research on development of a water-accounting model in which current studies involve the Stanford Watershed Model with modifications. This model includes details of the soil phase of the hydrologic cycle: Snowpack, impervious contributing areas, evapotranspiration, several layers of soil and groundwater storage, overland flow, flow through the soil, and channel storage and flow.

67C7 RADIATION

U.S. Weather Bureau, ESSA, Silver Springs Maryland 20910

An improved method has been developed for computing incoming long-wave radiation as a function of air temperature, dew point and solar radiation. Preliminary testing has been conducted on a first model of a solar radiation integrator based on calorimeter principle. A new design has been submitted to SDO for construction and testing.

67C8 COLORADO STORM STUDIES FOR WEATHER MODIFICATION INVESTIGATIONS

U.S. Weather Bureau, ESSA, Silver Springs Maryland 20910,
(Sponsored by The Bureau of Reclamation as part of its Atmospheric Water Resources Research Program)

Studies include typing with respect to season, atmospheric circulation, and physiography.

67C9 METEOROLOGICAL CONDITIONS FOR THE PROBABLE MAXIMUM FLOOD ON THE YUKON RIVER ABOVE RAMPART, ALASKA

U.S. Weather Bureau, ESSA, Silver Springs Maryland 20910
Study made for the Corps of Engineers.

Paper: Now in press.

67C6-67C9 inclusive

Inquiries with regard to these projects may be directed to Walter T. Wilson, Chief, Technical Information Branch, Office of Hydrology, U.S. Weather Bureau, ESSA, Silver Springs, Maryland 20910.

SECTION II - SUPPLEMENTAL INFORMATION

DATA SOURCES

1. The Director, Meteorological Branch, Department of Transport,
315 Bloor Street West, Toronto 5, Ontario

Data available on the following programs of a continuing nature.

A. Ice Observations

Areas covered include Eastern Canadian Seaboard, St. Lawrence Seaway and Great Lakes, Lake Athabasca and Great Slave Lake, Hudson Bay route to Churchill, and Waterways at the Arctic Archipelago.

Recent publications: Ice Observations - Eastern Canadian Seaboard - 1964, Canadian Inland Waterways - 1964

B. Ice Summaries and Analyses

Areas covered include Eastern Canadian Seaboard, Canadian Inland Waterways, Hudson Bay and Approaches, and Canadian Arctic.

Recent publications: Ice Summary and Analysis - Hudson Bay and Approaches - 1964, Eastern Canadian Seaboard - 1964, 1965

C. Snow Cover Data - Canada, published annually

D. Break-up and Freeze-up Dates in Canada

E. Ice Thickness Data for selected Canadian Stations

2. "Water Resources Research Catalog" of The Office of Water Resources Research, U.S. Department of the Interior, prepared annually by the Science Information Exchange of the Smithsonian Institution.
3. "Hydraulic Research in the U.S." prepared annually by the Bureau of Standards.
4. National Research Council, Canada

Canadian Geophysical Bulletin, published annually, includes a section prepared by the Subcommittee on Hydrology.

Selected Bibliography on Hydrology, published triennially.

5. U.S. Army Cold Regions Research and Engineering Laboratory (CRREL) Hanover, N.H. 03755. CRREL Report 12, Bibliography on Snow, Ice and Frozen Ground with Abstracts, Vol. XX, June, 1966.