

**Proceedings of the  
FIFTY-FIRST ANNUAL**

# **EASTERN SNOW CONFERENCE**

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## FOREWORD

The 51st annual Eastern Snow Conference (ESC) was held in Dearborn, Michigan, on June 15 and 16, 1994. The ESC is a valuable forum for discussing recent work on operational, applied, and scientific issues related to snow and ice. The program included oral and poster presentations, and displays of scientific equipment.

All of the papers in the proceedings received at least two technical reviews. The editors read each paper to ensure that the reviews were thoughtful and constructive, and that the authors appropriately considered review comments in the final paper. Based on originality, importance, and clarity of the written presentation, the reviewers also nominated papers for the ESC Honor Paper Award. The final versions of the honor paper candidates were reviewed by a five-person panel. The panel members had backgrounds and interests relevant to the topics of the nominated papers, and were selected by the editors. This year the panel reached almost unanimous consensus on the paper selected. The 1994 Honor Paper Award was presented to R.D. Brown and B.E. Goodison for their paper entitled, *The Sensitivity of the Arctic Climate System to Snowfall: Evidence from the Canadian High Arctic*.

This proceedings was published with the assistance of the Technical Communication Branch, Information Management Division, U.S. Army Cold Regions Research and Engineering Laboratory. This group contributed considerable time to this publication and enhanced the quality of these proceedings. The editors especially thank Sandra Smith and Edmund Wright for their efforts in the final production of this document.

Membership in the ESC is open to all interested individuals and corporations. Additional copies of the current proceedings and all back issues can be obtained from the Secretary. The annual meeting of the Eastern Snow Conference is cosponsored by the American Geophysical Union, the American Water Resources Association, and the State University of New York, Oswego Campus. Publication of these proceedings is made possible in part by Corporate Memberships in the Conference held by:

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- \* Ontario Hydro, 700 University Ave., Toronto, Ontario, Canada M5G 1X6
- \* Niagara Mohawk Power Corp., 300 Erie Blvd. West, Syracuse, New York 13202, USA

We look forward to the 52nd ESC meeting in Toronto, Canada, in June of 1995.

Mary R. Albert  
Editor

Susan Taylor  
Associate Editor

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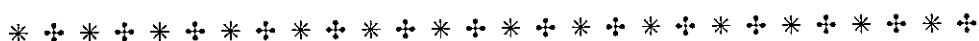
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## THE EASTERN SNOW CONFERENCE

The Eastern Snow Conference (ESC) is a joint U.S./Canadian organization which was founded in the 1940's. It is an association of people interested in research and applied aspects of the study of ice in all its forms, especially snow. The principal activities of the ESC are the organization of an annual meeting, in the U.S. or Canada in alternate years, and the production of the annual Proceedings of the Eastern Snow Conference, which now form more than forty volumes deposited in libraries throughout North America and Europe. The annual meetings are sometimes held in major cities such as Washington, Montreal, Toronto or Boston and sometimes in smaller cities such as Peterborough, Oswego, Portland or Fredericton.

The members of the ESC are a very diverse and, over the years, fluctuating, group. They include professional snow surveyors, engineers and technologists (of various stripes), professors and students, hydrologists and biologists, people responsible for keeping roads clear of snow and rivers free of ice, and others interested in snow and agriculture. The members are drawn from all parts of eastern North America, they live and work in places which extend from Maryland to the high Arctic. The line between the territory of the ESC and its counterpart in the other half of the continent, the equally venerable Western Snow Conference, is not a precise one. Residents of the Mid-west and of the Prairie provinces seem to join one or the other organization on the basis of personal whim such as a preference for Reno, Nevada, over Bangor, Maine, as a desirable meeting place.

In recent years, the annual ESC meetings have included sessions on snow and small mammals, snow and buildings, river ice, permafrost, remote sensing of snow and ice, biology of sea ice, snow and ice on lakes, measuring snow and ice, hydroelectricity and snow and ice, glaciers, icebergs, snow and farming, etc.



Eastern Snow Conference est une organisation internationale canado-américaine fondée dans les années '40. Elle regroupe des gens qui ont des intérêts communs dans l'étude théorique et pratique de la glace sous toutes ses formes, en particulier sous la forme de neige. Eastern Snow Conference a comme activités principales d'organiser sa réunion annuelle en alternant le site du Canada aux États-Unis, d'en produire les comptes-rendus qui se montent maintenant à plus de quarante volumes que l'on peut trouver dans les bibliothèques de l'Amérique du Nord et d'Europe. La réunion annuelle peut se tenir tout aussi bien dans des villes importantes comme Washington, Montréal, Toronto ou Boston comme dans des plus petites comme Peterborough, Oswego, Portland ou Frédéricton.

Les membres d' Eastern Snow Conference représentent un grand nombre de domaines reliés à la neige et la glace. On y retrouve des spécialistes des relevés de neige, des ingénieurs et des techniciens, des professeurs et des étudiants, des hydrologues et des biologistes, des gens ayant la responsabilité d'entretenir les chemins en hiver ou de contrôler la glace en rivière, d'autres ayant quelque intérêt dans la neige et l'agriculture. Tous ces membres viennent de l'est de l'Amérique du Nord et peuvent y habiter de Maryland, U.S.A., à l'Arctique. D'ailleurs la ligne qui sépare le territoire d' Eastern Snow Conference à son pendant de l'ouest la vénérable Western Snow Conference est assez diffuse. Les habitants du centre-ouest américain ou des Prairies peuvent choisir de rallier une ou l'autre organisation sur une base très personnelle comme de préférer d'aller à Reno, Nevada, plutôt que Bangor, Maine, pour leur colloque annuel.

Dans les dernières années, aux réunions annuelles d' Eastern Snow Conference on a tenu des sessions sur la neige et les petits mammifères, la neige et le bâtiment, la glace de rivière, le pergélisol, la télédétection de la neige et de la glace, la biologie de la glace marine, la neige et la glace lacustres, la mesure de la glace et de la neige, l'hydroélectricité et la glace et la neige, les glaciers, les icebergs, la neige et l'agriculture, etc.

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## THE PRESIDENT'S PAGE

The 51st Eastern Snow Conference in Dearborn, Michigan, was another very successful annual meeting, largely as a result of the contributions of many individuals. I personally thank David Norton, who did an excellent job coordinating the local arrangements for the meeting; Colin Taylor, who coordinated the stimulating and scientifically diverse technical program; and all the attendees, who actively participated in the meeting and survived the heat wave at the Henry Ford Estate.

The Henry Ford Fairlane Estate was a magnificent setting for the meeting. Everyone will long remember the horse-drawn carriage tours of Greenfield Village and the excellent food, drink and string quartet entertainment at the Eagle Tavern.

The procedure for colleague review of papers continues to improve each year. The Executive Committee feels these reviews have been very successful in improving the technical quality and presentation of papers in the proceedings. Attendees at this meeting saw excellent oral and poster presentations and were exposed to very innovative communication and presentation methods using laptop computers and overhead projection devices.

Consultations continue with the Western Snow Conference to coordinate a combined meeting in 1998. The ESC and WSC Executive Committees support the combined meeting format as a way to enhance the development of personal and professional relationships between people who study snow and ice in eastern and western North America.

Congratulations to Greg Mann of the University of Michigan for the winning paper in the student paper competition. The title of Greg's paper was "Diagnosing the Impacts of the Great Lakes on an Alberta Clipper." Greg was one of the innovative presenters using a personal computer and overhead projector during his excellent talk. The Research Committee did an excellent job of outreach to encourage this year's participation in the Student Paper competition.

The Technical Committee sponsored a "Notice Board" at the poster sessions for the first time at this meeting. This board is to encourage attendees to post notes on technical advances as well as requests for assistance with technical problems related to the study of snow and ice.

The editors of the conference proceedings, Mary Albert and Susan Taylor, deserve special mention. They have completed a difficult task in coordinating the final preparation of papers and supporting material for the proceedings of the 1994 ESC annual meeting. The quality and timeliness of this publication continues to improve as a result of their special efforts.

Finally, I thank all the members of the Executive Committee for their personal support of the ESC. As a result of the hard work and dedication of the committee chairs and committee members, the ESC continues to provide an international setting for the relaxed and friendly exchange of scientific information on snow and ice studies.

Preparations for the 52nd meeting are well under way. the 52nd Conference will be held in Toronto, 7-9 June 1995. I look forward to the Toronto meeting, and hope that you will all make plans to attend.

Derrill J. Cowing  
51st President  
Eastern Snow Conference