



**Proceedings of the
FIFTY-SEVENTH ANNUAL**

EASTERN SNOW CONFERENCE

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FOREWORD

This proceedings contains papers presented at the 57th annual Eastern Snow Conference (ESC) held in Syracuse, New York, USA, May 17–19, 2000. The ESC is a forum that brings the research and operations communities together to discuss recent work on scientific, applied, and operational issues related to snow and ice. Typical presentation topics at the conference include studies of the physics of snow and ice, snow removal, meteorological forecasting, river ice control, hydrochemical response of snowmelt, and remote sensing of snow and ice. The conference program includes oral and poster presentations, as well as displays of scientific equipment.

This is our second proceedings where the review process was optional and submitted papers could include extended abstracts or full papers. We hope these changes encourage more submissions of both operational and scientific content. ESC participants were also invited to submit papers relevant to winter hydrology to the international journal, *Hydrological Processes*. These papers went through a formal journal review, revision, and referee process and appear both in these proceedings and in the December 2000 issue of the journal. John Pomeroy of the University of Wales in Aberystwyth joins me in editing this special issue of *Hydrological Processes* dedicated to ESC papers.

We thank members of the Technical Communication Branch, Information Management Division, at the U.S. Army Cold Regions Research and Engineering Laboratory, Engineer Research and Development Center. Over the years this group has contributed considerable time to this publication and has enhanced the quality of these proceedings. We especially thank Gioia Cattabriga and David Cate for their efforts in the final production of these proceedings.

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 sponsored by the American Geophysical Union. Publication of these proceedings is made possible by membership fees and by Corporate Memberships in the Conference held by:

New Brunswick Department of the Environment
Water Resources
Province of New Brunswick
P.O. Box 6000
Fredericton, New Brunswick E3B 5H1

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75 Rene Levesque Ouest
9^e etage
Montréal, Quebec H2Z 1A4

Campbell Scientific (Canada) Corporation
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Edmonton, Alberta T5M 1W7

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8 Greenwood Hills
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I look forward to seeing many of you at the 58th Eastern Snow Conference meeting, in Ottawa, Ontario, Canada, May 14–17, 2001. This meeting will be combined with the Canadian Geophysical Union–Hydrology Section and promises an exciting program with the theme of “Snow and Ice: Principles, Processes, Management and Use.”

Janet Hardy
Editor

These Proceedings Are Dedicated
to
Donald Dunlap
1919-2000
— ESC Life Member —

The Eastern Snow Conference lost a Life Member in March of 2000 when Dr. Donald V. Dunlap died at the age of 81. Don was a great friend of the ESC and, according to John Metcalfe, "...brought the ESC into the 20th century as Secretary/Treasurer by creating a computer data base of members."

Don was the New Jersey state climatologist for the National Weather Service until 1973 when he retired. After his retirement, he earned a Ph.D. in Geography at Rutgers University and taught courses in meteorology at Rutgers and at Temple University. He was also a consulting professional meteorologist, statistical programmer, and computer consultant. In addition to his officer duties in the ESC, Don was a fellow of the Royal Scottish Geographical Society and a fellow of the Sigma Xi chapter of the American Association for the Advancement of Science. He was active for more than 50 years in the Boy Scouts of America, and was honored by the Boy Scouts for his contributions.

Don was the ESC President in 1979 and our secretary/treasurer for many years following his presidency. He kept our books balanced and helped keep the ESC on course during the 1980s when the membership and meeting attendance dwindled. Don acted as ESC historian, and was often looked upon for advice and always had something nice to say—we'll miss him.

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STATEMENT OF PURPOSE

The Eastern Snow Conference (ESC) is a joint Canadian/U.S organization founded in the 1940s, originally with members primarily from eastern North America. Our current members are scientists, snow surveyors, engineers, technicians, professors, students, and operational and maintenance professionals from North America, as well as the United Kingdom, Japan, and Germany. There is a western counterpart to the ESC, the Western Snow Conference (WSC), which also is a joint Canadian/U.S. organization. Every fifth year the ESC and the WSC hold joint meetings.

The Eastern Snow Conference is a forum that brings the research and operations communities together to discuss recent work on scientific, applied, and operational issues related to snow and ice. The location of the conference alternates yearly between the United States and Canada, and attendees present their work by either giving a talk or presenting a poster. Most resulting papers are reviewed, edited, and published in our yearly *Proceedings of the Eastern Snow Conference*. In recent years, the ESC meetings have included sessions on snow physics, winter survival of animals, snow and ice loads on structures, river ice, remote sensing of snow and ice, and glacier processes. Volumes of the *Proceedings* can be found in libraries throughout North America and Europe, and the papers are also available through the National Technical Information Service (NTIS) in the United States and CISTI in Canada.

* * * * *

Le Colloque sur la neige-region est (ESC) est une organisation americano-canadienne fondee dans les annees '40 et dont les membres provenaient a l'origine surtout de l'est de l'Amerique-du-Nord. Actuellement, les membres, qu'ils soient chercheurs, techniciens en enneigement, ingenieurs, techniciens, professeurs, etudiants, ou specialistes des services d'exploitation et d'entretien, viennent non seulement d'Amerique du nord, mais aussi du Royaume Uni, du Japon, et d'Allemagne. Le Colloque sur la neige-region ouest (WSC), aussi une organisation americano-canadienne, est l'homologue de l'ESC pour l'ouest nord-americain. Tous les cinq ans, l'ESC et la WSC organisent des reunions en commun.

Le Colloque sur la neige-region est un forum qui rassemble chercheurs et responsables des services d'exploitation pour discuter des travaux recents sur les problemes scientifiques, operationnels, ou autres dus a la neige et a la glace. Le site de cette reunion annuelle alterne entre les Etats Unis et le Canada. Les participants y presentent les resultats de leurs travaux par des communications orales ou au moyen d'affiches. Ces communications, une fois revues et editees, sont publiees dans les Annales de l'ESC. Dans les annees recentes, les reunions de l'ESC ont inclus des sessions sur la physique de la neige, la survie hivernale de la faune, les forces exercees par la neige et la glace sur les structures et les batiments, la glace de riviere, la teledetection de la neige et de la glace, et les processus glaciaires. Les annales de l'ESC sont accessibles dans la plupart des bibliotheques scientifiques d'Amerique-du-Nord et d'Europe. Des copies d'articles peuvent etre obtenues du National Technical Information Service (NTIS) aux Etats Unis et son equivalent au Canada, le CISTI.

EXECUTIVES FOR THE 57TH EASTERN SNOW CONFERENCE

PRESIDENT

Dorothy K. Hall
NASA Goddard Space Flight Center
Hydrological Sciences Branch, Code 974
Greenbelt, Maryland 20771

PAST PRESIDENT

Ross Brown
Meteorological Service of Canada (MSC)
2121 Trans Canada Highway
Dorval, Quebec H9P 1J3

VICE-PRESIDENT

Mary Albert
Engineer Research and Development Center
Cold Regions Research and Engineering Laboratory (ERDC-CRREL)
72 Lyme Road
Hanover, New Hampshire 03755-1290

SECRETARY-TREASURER

Miles Ecclestone (Canada)
Department of Geography
Trent University
Peterborough, Ontario, Canada K91 7B8

SECRETARY-TREASURER

Austin Hogan (United States)
ERDC-CRREL (retired)
72 Lyme Road
Hanover, New Hampshire 03755-1290

ESC and *Hydrological Processes* Special Issue Editor

Janet Hardy
ERDC-CRREL
72 Lyme Road
Hanover, New Hampshire 03755-1290

Hydrological Processes Special Issue Editor

John Pomeroy
Centre for Glaciology, Institute of Geography and Earth Sciences
University of Wales
Aberystwyth, Ceredigion
Wales SY23 3DB United Kingdom

STEERING COMMITTEE

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* Deceased March 2000

THE PRESIDENT'S PAGE

The 57th Eastern Snow Conference in Syracuse, New York, was an unqualified success! Attendance was strong for the day-and-a-half of meetings; the topics were diverse and the talks and posters were well presented. The weather on the first full day of the meeting was enough to keep anyone indoors, but it improved for our respective trips home on Friday. Arrangements at the Holiday Inn were excellent as planned by the Local Arrangements Committee, consisting of Life Member Art Eschner, Horace Shaw III of State University of New York (SUNY) Environmental Science and Forestry, and by Mary Albert, Program Chair of the 2000 meeting.

The international flavor of the conference is exemplified by papers from England (David Collins) and Wales (John Pomeroy) as well as from Canadian and U.S. scientists. Though there were no student papers for the student-paper competition this year, there were a number of students present from local Syracuse University and from several other universities in Canada and the United States.

Our banquet speaker was Dave Eichorn, a television meteorologist and a former student of Bob Sykes, an ESC Life Member who passed away in 1999. Bob had been looking forward to co-chairing the Local Arrangements Committee with Art for the Syracuse meeting.

In 2000, we lost one life member, Don Dunlap, and we gained another, Gerry Jones. This Proceedings volume is dedicated to Don as a tribute to his long service and valuable contributions to the ESC. It was an honor for me to bestow life membership on our long-time member and former president, Gerry Jones. Gerry's many years of service and dedication to the ESC have been very much appreciated. Life Membership is the highest honor that the ESC Executive can give to a member and is given in consideration of both service to the ESC and contributions to the ice and snow community. Gerry is the fifth Life Member, and joins Art Eschner, Austin Hogan, Hilda Snelling, and Don Wiesnet.

The Sno-Foo award was given to Mauri Pelto for his audacity in requesting that the audience sing a parody of "Take Me Out to the Ball Game" as a seventh-inning stretch before his talk. Thanks go to John Pomeroy for instantly recognizing Sno-Foo-like behavior when he sees (and hears) it, and for presenting the award to Mauri at the banquet, and to Mauri for being such a good sport. Considering the quality of the lyrics and singing, Mauri richly deserved the award. Parenthetically, when we sang again later that evening at the banquet, following our sampling of the New York wines, the singing was considerably more robust.

The Executive Committee continues to change, as Mary Albert ascended to Presidency, and John Pomeroy to the Vice Presidency and Program Chair at the close of the Syracuse meeting. While Austin Hogan is easing out of his Treasurer duties, which will be taken over by Derrill Cowing, he is also now Chair of the Steering Committee. Miles Ecclestone continues to serve the ESC as Canadian Treasurer. Andrew Klein is now head of the Research Committee, and promises to "beat the bushes" for student papers for next year. Janet Hardy and John Pomeroy agreed to serve an additional year as editors, and Ross Brown continues as ESC Webmaster. The editors deserve a special vote of appreciation for their hard work in maintaining a high quality Proceedings volume. (I would also like to express our gratitude to Susan Taylor who did an amazing job as ESC Proceedings editor for the past five years.) We thank the U.S. Army Cold Regions Research and Engineering Laboratory (CRREL) for its continued and professional editorial support of the Proceedings.

Thanks also go to Miles for writing a geographic history of the ESC that is included in this Proceedings.

The 2001 meeting will be held in Ottawa, Ontario, in conjunction with the Canadian Geophysical Union. John Pomeroy has already been hard at work planning it jointly with the CGU. It promises to be a seminal meeting, the results of which will launch us solidly into the 21st century. Please consult the ESC Web page (<http://www.msc-smc.ec.gc.ca/CRYSYS/esc/>) for details. See you in Ottawa!

Dorothy K. Hall
57th President
Eastern Snow Conference