



**Proceedings of the
67th ANNUAL**

EASTERN SNOW CONFERENCE

8–10 June 2010

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Proceedings of the Eastern Snow Conference

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FOREWORD

This proceedings volume contains papers presented at the 67th Eastern Snow Conference (ESC) held 8–10 June 2010 at the Jiminy Peak Resort, Hancock, Massachusetts, USA. The general theme of the meeting was “Here today gone tomorrow, the Eastern North America Cryosphere.”

The ESC is a joint United States and Canadian forum for discussing recent work on operational, applied and scientific issues related to snow and ice. It also retains an increasing interest as a symposium where novel approaches to cryospheric science of international significance are presented. The ESC has published an annual series of proceedings since 1952. Typical topics include studies of snow and ice as materials, snow removal, meteorological forecasting, river ice control, snow hydrology, snow chemistry, glaciology, remote sensing of snow and ice, and snow ecology. 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. Additional information about the Eastern Snow Conference may be found at: <http://www.easternsnow.org/>

We continue with an optional review process and authors may submit extended abstracts or full papers to the Proceedings. Participants in the Western Snow Conference (WSC - <http://www.westernsnowconference.org/>) were invited to join the ESC participants in the option 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 many appear both in these proceedings and in the journal. John Pomeroy (University of Saskatchewan), Kelly Elder (USFS, Ft. Collins) and Andrew Klein (Texas A&M University) edit this special issue of *Hydrological Processes* dedicated to ESC/WSC papers.

We thank members of the Library Sciences and Knowledge Transfer (LSKT) Branch, at the Engineering Research and Development Center, Cold Regions Research and Engineering Laboratory (ERDC-CRREL). 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 for her effort on behalf of these proceedings.

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We look forward to seeing many of you at the 68th Eastern Snow Conference meeting to be held 14–16 June 2011 at the McGill University Faculty Club, Montreal, Canada. Along with the typical session topics, this year's will have a special session on "Cryospheric controls on biogeochemical processes."

Robert Hellström and Susan Frankenstein
ESC Proceedings Editors
Bridgewater State College and ERDC-CRREL

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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, 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-région est (ESC) est une organisation américain-canadienne fondée dans les années '40 et dont les membres provenaient à l'origine surtout de l'est de l'Amérique-du-Nord. Actuellement, les membres, qu'ils soient chercheurs, techniciens en enneigement, ingénieurs, techniciens, professeurs, étudiants, et spécialistes des services d'exploitation et d'entretien, viennent non seulement d'Amérique-du-Nord, mais aussi du Royaume Uni, du Japon, et d'Allemagne. Le Colloque sur la neige-region ouest (WSC), aussi une organisation américain-canadienne, est l'homologue de l'ESC pour l'ouest nord-américain. Tous les cinq ans, l'ESC et la WSC organisent des réunions en commun.

Le Colloque sur la neige-region est un forum qui rassemble chercheurs et responsables des services d'exploitation pour discuter des travaux récents sur les problèmes scientifiques, opérationnels, ou autres dus à la neige et à la glace. Le site de cette réunion annuelle alterne entre les États Unis et le Canada. Les participants y présentent les résultats de leurs travaux par des communications orales ou au moyen d'affiches. Ces communications, une fois revues et éditées, sont publiées dans les *Annales de l'ESC*. Dans les années récentes, les réunions de l'ESC ont inclus des sessions sur la physique de la neige, la survie hivernale de la faune, les forces exercées par la neige et la glace sur les structures et les bâtiments, la glace de rivière, la télédétection de la neige et de la glace, et les processus glaciaires. Les *Annales de l'ESC* sont accessibles dans la plupart des bibliothèques scientifiques d'Amérique-du-Nord et d'Europe. Des copies d'articles peuvent être obtenues du National Technical Information Service (NTIS) aux États Unis et son équivalent au Canada, le CISTI.

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THE PRESIDENT'S PAGE

Once again, the Annual Eastern Snow Conference was a highlight of the cryospheric sciences meetings calendar. The 67th annual meeting was held at Hancock, Massachusetts, nestled in the delightful Berkshires. The theme of the meeting, "*Here today gone tomorrow, the Eastern North America Cryosphere*" consisted of 49 excellent presentations. Our 53 attendees stayed on site at the Jiminy Peak Mountain Resort, which provided superb hospitality and a picturesque venue for the meeting. Thank you to all the presenters and attendees for making the meeting a huge success.

Vice President and program chair Mauri Pelto put together a fine program. There were 25 high quality oral presentations in seven non-concurrent sessions and an ongoing interactive poster session that featured 24 excellent posters. Each poster presenter was allotted a couple of minutes during the first day to present their poster. Thanks to Mauri Pelto of the local arrangements committee for selecting a great venue and for managing the meeting with such aplomb. This year, once again, we were to have a mid-conference tour during the late afternoon of the first day of talks. This was to have been to the Zephyr wind turbine at the resort, which provides about one third of the resort's annual energy. Unfortunately, the weather was unkind and it was rained off. However, we did hear from Jiminy Peak CEO Brian Fairbank what can be achieved when community, local industry, municipal, and state funding agencies come together behind an environmentally sustainable approach to energy generation in the ski industry sector. We were treated to a fascinating post-banquet presentation by Austin Hogan on early Antarctic research.

As always, student participation is a crucial component of the ESC and the 67th Annual Meeting was no exception. Student research is acknowledged with three awards: the Wiesnet Award is given to the best student paper, the Campbell Scientific (Canada) award is given to students registered at a Canadian higher education who demonstrate innovative technical expertise in data collection, and the David Hewitt Miller Award is presented for the best student poster presentation. This year the Wiesnet Award was presented to Simon von de Wall (University of Victoria, British Columbia) and the David Hewitt Miller Award to Nicolas Svacina (University of Waterloo, Ontario). On a lighter note, the Annual Sno-Foo is presented to a distinguished snow scientist who, in striving for excellence in snow research, contributes to an event of notable humour. This year's winner was a student, from the University of Waterloo, Ontario, for their notable mastery of a snow machine.

This year is the second year that you will be reading this on a DVD, or after the 2011 meeting, online via the ESC website (www.easternsnow.org). Susan Frankenstein and Rob Hellström continue to provide exceptional leadership in producing the ESC Proceedings each year. The entire back catalogue of Proceedings is now being made available online at the ESC website. Once again, many thanks and kudos to Andrew Klein and Miles Ecclestone for coordinating this effort. We continue to produce an annual special issue of Hydrological Processes that further highlights the research conducted by ESC members. This year, the special issue shepherding has been taken over from our long-standing editors, John Pomeroy and Andrew Klein. We thank them for their generous and dedicated service. Mauri Pelto and Richard Kelly are now organizing this aspect and it is anticipated that an injection of fresh blood into the process will help to continue to expedite this important element of the Conferences activities.

The ongoing success of the ESC depends on extensive behind-the-scenes efforts by our volunteer executives. Notable thanks are due to Miles Ecclestone and Derrill Cowing, our Canadian and American secretary treasurers, who ensure the financial stability of the ESC and always contribute significantly to the organization of the annual meeting.

I'd like to invite you to the 2011 Eastern Snow Conference to be held at the McGill University Faculty Club, McGill University, Montreal, QC, from 14–16 June 2011. The conference has not been held in Montreal since 1985, when one W. Peter Adams was the ESC president. With Jim Buttle (Trent University) as the program chair and the local arrangements committee's efforts spearheaded by Ross Brown (Environment Canada/Ouranos), the meeting is likely to be a lively one. A special session this year will focus on "*Cryospheric controls on biogeochemical processes.*" Students are encouraged to enter the ESC Student Paper Competitions. Please continue to check the ESC website for further information.

I wish you a safe and successful field season. Thank you for supporting the Eastern Snow Conference and I look forward to seeing you next year in Montreal.

Richard Kelly
67th President
Eastern Snow Conference

*Eastern Snow Conference
Contributions*

*Wiesnet Medal for Best
Student Paper*

