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Dr. Peter Adams
1936-2018

The Proceedings of the 75th Eastern Snow Conference is dedicated to Life Member Peter Adams, who passed away on September 28, 2018 in Peterborough, Ontario, Canada, at the age of 82.

Dr. Adams’ achievements include more than 60 peer-reviewed articles and several books, mostly related to snow and ice research and in particular to his glaciological work on Axel Heiberg Island, which is the longest continuous study of its kind in the High Arctic. Born in England, he moved to Montreal in 1959 with a Carnegie Arctic Scholarship, and completed his PhD in Geography and Glaciology at McGill University. In 1968, he became the founding Chair of the Department of Geography at Trent University. Later in life, his attention turned to politics at both the provincial and federal levels, promoting and advancing science and scholarship. After retirement, Peter and his wife Jill devoted their time to volunteer work with children around the world.

Peter was ESC President in 1984-85 and won the Sno-Foo Award in 1986 for his impromptu “yellow snow” experiment during a snow sculpture event on a U.S. university campus.

He will be greatly missed.
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FOREWORD

This proceedings volume contains papers presented at the 75th Eastern Snow Conference (ESC) held 5-8 June 2018 in College Park, Maryland, USA. The meeting featured oral and poster sessions on recent advances in remote sensing, remote sensing theory, applications of remote sensing ranging from the ice sheets to the tropics, snow and ice processes, and hydroclimatology.

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 thank members of the ESC executive committee (especially Mauri Pelto) for outstanding effort in publishing ESC 2017 proceedings in Physical Geography. Over the years, the proceedings committee has contributed considerable time to this publication and has enhanced the quality of these proceedings.

The 2018 meeting of the Eastern Snow Conference and these Proceedings were made possible in part by Corporate membership from Campbell Scientific Canada, Geonor, and Hoskin Scientific Ltd. The National Oceanic and Atmospheric Administration’s Center for Weather and Climate Prediction provided meeting space, technical, and logistic support.

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We look forward to seeing you at the 76th Eastern Snow Conference meeting to be held 4–6 June 2019 at the Lake Morey Resort in Fairlee, Vermont, USA.

Krystopher Chutko and George Riggs
ESC Proceedings Co-Editors
University of Saskatchewan and NASA GSFC/SSAI
STATEMENT OF PURPOSE

The Eastern Snow Conference (ESC) is a joint Canadian/US 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/US 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.


L’ESC 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 75th annual meeting of the Eastern Snow Conference was held at the NOAA Center for Weather and Climate Prediction, Climate Prediction Center, College Park, Maryland, USA from June 5 - 8, 2018. The NOAA Center for Weather and Climate Prediction in College, houses dedicated scientists who provide the United States with expert weather, water, and climate forecasts that touch everyone’s lives. Opened in August 2012, the center provides a seamless suite of environmental analysis, diagnostics and forecasts from the surface of the sun to the depths of the ocean floor. This integrated facility advances NOAA’s effort to build a Weather-Ready Nation through improved precision forecasts, effective communications and strong partnerships.

The scientific program included 34 oral presentations and 29 poster presentations. The theme of this year’s program was “Snow past present and future”. Once again, the student participation was excellent, representing nearly 40% of the attendees and resulting in very stimulating presentations. The Research Committee at the Banquet recognized the following students for exemplary achievement:

- Jiyue Zhu from the University of Michigan received the Wiesnet Medal for the best student paper entitled “Retrieval algorithm of snow water equivalent using SnowSAR and scatterometer backscatters with both co- and cross-polarizations”.
- Justin M. Pflug from the University of Washington received the David Hewitt Miller Best Student Poster Award for his team’s poster entitled “Adapting model representation of liquid water percolation in maritime environments”.

We were very fortunate to have Dr. Louis Uccellini, NOAA Assistant Administrator for Weather Services and Director National Weather Service, deliver the Banquet Address. His address presented a very interesting overview of snowstorm forecasting in the last decades.

Ronny Schroeder presented the coveted Sno-Foo Award to Alexandre Langlois from Université de Sherbrooke, for destroying a pickup truck door on a snow bank.

Dorothy Hall also introduced our new prestigious Life Member, Dr. James Foster.

A special thanks to George Riggs who was the Vice-President and Program Chair. Thanks to Sean Helfrich and Barton Forman for local arrangements. ESC Executive Committee Members Krys Chutko, Miles Ecclestone, Derrill Cowing and Ken Rancourt continue to provide outstanding leadership and were instrumental to the success of the 75th meeting. The efforts of webmaster Vincent Sasseville, and members of the steering and research committees are also greatly appreciated. Likewise, the meeting would not have been a success without the participation and continued support of our corporate members: Campbell Scientific Canada, Geonor, and Hoskin Scientific.

Please plan to attend the 76th Eastern Snow Conference at Lake Morey, Vermont, USA, from June 4 - 6, 2019. Elias Deeb, Cold Regions Research and Engineering Laboratory, is the Vice-President and Program Chair. Students should check the ESC website for more information on submitting papers for the Wiesnet Medal.

Thank you for your participation and support of the Eastern Snow Conference and I look forward to seeing you all next year in Vermont. In the meantime, best wishes for a snowy, safe, and successful field season!

Alexandre Roy
75th President
Eastern Snow Conference
Dr. James Foster – ESC Life Member

The Eastern Snow Conference gratefully recognizes individuals who have made lifelong contributions to the study of snow and ice, and for their support of this organization. At the 75th Eastern Snow Conference, Dr. James Foster was inducted as the newest Life Member, joining Peter Adams, Barry Goodison, Gerry Jones, John Metcalfe, Hilda Snelling, and Donald Wiesnet.

Induction presented by Dorothy Hall

It’s my pleasure to introduce Jim Foster as a new Life Member of the Eastern Snow Conference!

Jim has made substantial and long-lasting contributions to snow and ice research. He has also worked to further the public understanding of Earth Science and is an enthusiastic member of the Eastern Snow Conference.

As Jim mentioned yesterday in his talk, his first Eastern Snow Conference was in 1978, at the 35th. Here’s a picture of Jim that was taken around 1978. It’s hard to believe that that was 40 years ago, because the 35th was my first ESC meeting, too! Jim remembers that Don Wiesnet, also a Life Member, encouraged us to attend that meeting which was held in early February at CRREL in Hanover, New Hampshire. With his remarkable memory of details, Jim also recalls the weather being very cold, but not snowy, during that meeting. In fact, that was the last ESC that was held during the winter. Since then they’ve all been held in the spring to avoid unpleasant distractions… like snowstorms.

At that 1978 meeting, Jim gave a presentation about the extensive ice cover on the Chesapeake Bay during the very cold winter of 1976-77. Along with two co-authors, Dorothy Schultz and Bill Dallam, he inferred ice-type and -thickness categories from Landsat images. Forty years later, Jim continues to study ice conditions in the Bay, as we heard in his very interesting talk yesterday just before the cruise.
During Jim’s long and successful career with NASA / Goddard Space Flight Center, he focused on studying snow using satellites – mainly using Landsat visible/near-IR data in the early years, and later, passive-microwave data. He wrote a ground-breaking paper in 1989 noting the increasingly-earlier disappearance of snow cover in Arctic tundra areas. A huge body of literature on related topics has followed. He’s also made substantial contributions to the difficult problem of assessing snow-water equivalent from space. Also, notably, Jim contributed to the study of snow crystals using scanning electron microscopy.

Jim has done field work in many cold places all over the world including Antarctica and Greenland, and in addition, he’s been and continues to be very active in science outreach.

Although Jim never botched anything up badly enough to be a recipient of the coveted Sno-Foo award, over the last 40 years he’s been a big supporter and frequent presenter at the ESC. Jim served as President in 1989, and presided over the 46th annual meeting, which was held in Quebec City.

On behalf of the current Executive Committee I hereby induct you, Jim Foster, as a Life Member of the Eastern Snow Conference!
The Eastern Snow Conference encourages student research through its Wiesnet Medal. This medal is presented annually to the best student paper presented at the conference.

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<tr>
<th>Year</th>
<th>Winner</th>
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<tr>
<td>2018</td>
<td>Jiyue Zhu</td>
<td>University of Michigan</td>
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<td>2017</td>
<td>Caroline Dolant</td>
<td>Université de Sherbrooke</td>
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<td>2016</td>
<td>Syed Mousavi</td>
<td>University of Michigan</td>
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<td>2015</td>
<td>Nicolas Leroux</td>
<td>University of Saskatchewan</td>
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<td>2014</td>
<td>Justin Hartnett</td>
<td>Syracuse University</td>
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<td>2013</td>
<td>Andreas Dietz</td>
<td>Earth Observation Center/DFD, Germany</td>
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<td>2012</td>
<td>Caroline Dolant</td>
<td>Université de Sherbrooke</td>
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<td>2011</td>
<td>Kathryn Semmens</td>
<td>Lehigh University</td>
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<td>2010</td>
<td>Simon von de Wall</td>
<td>University of Victoria</td>
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<td>2009</td>
<td>Si Chen</td>
<td>Dartmouth College</td>
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<td>2008</td>
<td>Chris Fuhrmann</td>
<td>University of North Carolina at Chapel Hill</td>
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<td>Y.C. Chung</td>
<td>University of Michigan</td>
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<td>M. Javan-Mashmool</td>
<td>Université du Québec à Chicoutimi</td>
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<td>Université du Québec à Chicoutimi</td>
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<td>2003</td>
<td>Alexandre Langlois</td>
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<td>C. Tavakoli</td>
<td>Université du Québec à Chicoutimi</td>
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David Miller Award

The David Miller Award is presented to the best student poster at the annual Conference.

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Campbell Scientific Canada Prize

The Campbell Scientific Canada prize is awarded to student research showing the most innovative use of technology in the gathering of data.

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