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Geographic Variation of Cirques on Iceland: Factors Influencing Cirque Morphology

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Geographic Variation of Cirques on Iceland: Factors Influencing Cirque Morphology

Abstract
Cirques are one of the most common glacial landforms in alpine settings. They also provide important paleoclimate information (e.g. Meierding 1984; Evans 2006). The purpose of this study is to fill in gaps in the climate record of Iceland by conducting a quantitative analysis of cirques in three regions in Iceland: Tröllaskagi, the East Fjords, and Vestfirðir. Iceland, located in the center of the North Atlantic Ocean, contains many small glaciers, in addition to large ice caps. The glaciers on Iceland are particularly sensitive to variations in oceanic and atmospheric circulation (Andresen et al. 2005; Geirsdóttir et al., 2009; Ólafsdóttir et al. 2010). Iceland thus provides an excellent case study to examine factors influencing glacial landforms such as cirques. (*excerpt*)

Keywords
Cirques, Iceland, climate record, glaciers, ice caps

Disciplines
Climate | Environmental Indicators and Impact Assessment | Environmental Studies

Comments
This abstract was presented at the 47th International Arctic Workshop in Buffalo, NY, March 23-25 2017.

Authors
Heather A. Ipsen, Rachael E. Grube, Jessica F. Lee, and Sarah M. Principato

PROGRAM AND ABSTRACTS

47TH ANNUAL INTERNATIONAL ARCTIC WORKSHOP

March 23-25, 2017
Buffalo, New York

Sponsored and Hosted by:
University at Buffalo
Center for GeoHazards Studies
College of Arts and Sciences
Department of Geology
The RENEW Institute

Organizing Committee:
Jason Briner
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Beata Csatho
Avriel Schweinsberg
Elizabeth Thomas
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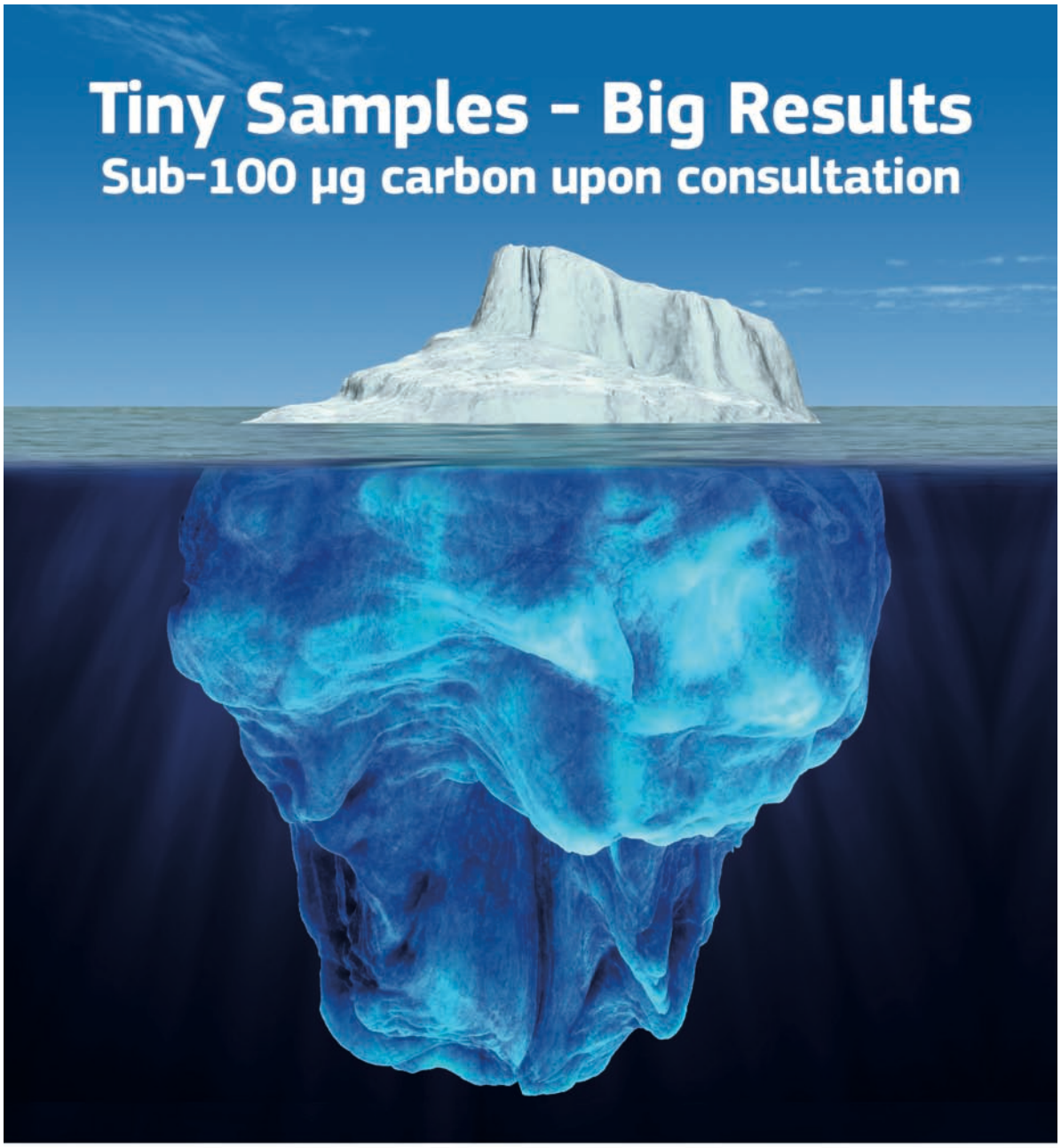

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Introduction

Overview and history
The 47th Annual International Arctic Workshop will be held March 23-25, 2017, on the campus of the University of Buffalo. The meeting is sponsored and hosted by the University at Buffalo, Center for GeoHazard Studies, College of Arts and Sciences, Department of Geology, and the RENEW Institute. This workshop has grown out of a series of informal annual meetings started by John T. Andrews and sponsored by INSTAAR and other academic institutions worldwide.

2017 Theme
"Polar Climate and Sea Level: Past, Present & Future"

Website
https://geohazards.buffalo.edu/aw2017

Check-In / Registration
Please check in or register on (1) Wednesday evening at the Icebreaker/Reception between 5:00 – 7:00 pm in the Davis Hall Atrium (UB North Campus), or (2) Thursday morning between 8:00 – 8:45 am in the Davis Hall Atrium. At registration those who have ordered a print version will also receive their printed high-resolution volume.

Davis Hall
Davis Hall is located between Putnam Way and White Road on the UB North Campus. Davis Hall is directly north of Jarvis Hall and east of Ketter Hall. To view an interactive map of North Campus, please visit this webpage: https://www.buffalo.edu/home/visiting-ub/CampusMaps/maps.html

Wi-Fi
Wireless internet access is available ("UB_Connect").

Posters
At registration you will receive information on where to set up your poster. Please put it up as early as possible on the day that you are presenting, and leave it up as late as possible. There will be two poster sessions; one on each day of the workshop.

Presentation Files (e.g., PowerPoint)
Please load your presentation onto our computer during Check-In/Registration on Thursday or Friday mornings between 8:00 – 8:55 am. Time during breaks is limited.

Arctic Workshop 2017
Program Summary

Wednesday March 22		
5:00-7:00	**Evening Reception, Check-in & Registration**	Davis Hall Atrium

Thursday March 23		
8:00-8:45	**Check-in & Registration** Load presentations onto computer, put up posters	Davis Hall Atrium
8:45-9:00	Welcome & Introduction	Davis Hall 101
9:00	**Baffin Bay/Greenland Paleoclimate 1 talks**	Davis Hall 101
10:30	30 minute coffee break	Davis Hall Atrium
11:00	**Baffin Bay/Greenland Paleoclimate 2 talks**	Davis Hall 101
12:00	Lunch buffet provided	Davis Hall Atrium
1:00	**Poster Session 1**	Davis Hall Atrium
2:30	Posters and coffee	Davis Hall Atrium
3:00	**Arctic Paleoclimate talks**	Davis Hall 101
4:00	**Invited talk: Isla Castañeda**	Davis Hall 101
5:00	Happy Hour	Davis Hall Atrium
5:30	**Keynote Talk by Eric Steig**	Davis Hall 101
6:30	Banquet Dinner	Davis Hall Atrium

Friday March 24		
8:55-9:00	Welcome & Introduction	Davis Hall 101
9:00	**Glacier Dynamics 1 talks**	Davis Hall 101
10:30	30 minute coffee break	Davis Hall Atrium
11:00	**Glacier Dynamics 2 talks**	Davis Hall 101
12:00	Lunch buffet provided	Davis Hall Atrium
1:00	**Poster Session 2**	Davis Hall Atrium
2:30	Posters and coffee	Davis Hall Atrium
3:00	**Alaska Paleoclimate talks**	Davis Hall 101
4:00	**Invited talk: Gifford Miller**	Davis Hall 101
5:00	Happy Hour	Davis Hall Atrium

Saturday March 25		
9:00-2:00	Niagara Falls field trip followed by Big Ditch Brewery	Depart from Spot Coffee, Williamsville

Program Details

PM - Wednesday March 22

5:00-7:00 **Evening Reception, Check-in & Registration** — Davis Hall Atrium
Snacks and drinks will be served, including beer and wine.

AM - Thursday March 23

8:00-8:45 **Check-in & Registration** — Davis Hall Atrium
Load presentations onto computer, put up posters

8:45-9:00 **Welcome & Introduction** — Davis Hall 101
Jason Briner, Chair of Organizing Committee

1. Baffin Bay/Greenland Paleoclimate 1 - Talks

Chair: Gifford Miller

9:00 **HOLOCENE CLIMATE AND OCEAN CONDITIONS IN THE EASTERN CANADIAN ARCTIC AND GREENLAND: LAND-SEA LINKAGES**
Anne de Vernal, Estelle Allan, Bianca Fréchette, Claude Hillaire-Marcel

9:15 **THE EARLY HOLOCENE GLACIATION IN BAFFIN BAY PROJECT: INITIAL RESULTS**
Nicolás Young, Gifford Miller, Jason Briner, Joerg Schaefer, Sarah Crump, Alia Lesnek, Simon Pendleton

9:30 **ICE, LAKES & CLIMATE: EXPLORING THE COMPLEXITIES OF PROGLACIAL-THRESHOLD LAKE SEDIMENTARY RECORDS FROM WESTERN GREENLAND**
Heidi Roop, Jason Briner, Nicolás Young

9:45 **LATE-WISCONSINAN MAXIMUM EXTENT AND DECAY OF THE LAURENTIDE ICE SHEET ON THE NORTHEASTERN BAFFIN ISLAND CONTINENTAL SHELF**
Etienne Brouard and Patrick Lajeunesse

10:00 **ICE CORE MEASUREMENTS OF 14CH4 SHOW NO EVIDENCE OF METHANE RELEASE FROM METHANE HYDRATES OR OLD PERMAFROST CARBON DURING A LARGE WARMING EVENT 11,600 YEARS AGO**
Vasilii Petrenko, Andrew Smith, Hinrich Schaefer, Katja Riedel, Edward Brook, Daniel Baggenstos, Christina Harth, Quan Hua, Christo Buizert, Adrian Schilt, Xavier Fain, Logan Mitchell, Thomas Bauska, Anais Orsi, Ray F. Weiss, Jeffrey P. Severinghaus

10:15 **THE PROVENANCE OF GLACIAL MARINE SEDIMENTS IN BAFFIN BAY AND APPLICATION TO LATE QUATERNARY CHANGES IN ICE SHEET ACTIVITY**
John Andrews

10:30 **COFFEE BREAK** (Davis Hall Atrium)

2. Baffin Bay/Greenland Paleoclimate 2 - Talks

Chair: Anne Jennings

11:00 **TOWARDS MULTI-DECADAL TO MULTI-MILLENNIAL ICE CORE RECORDS FROM COASTAL WEST GREENLAND ICE CAPS**
Sarah Das, Matthew Osman, Luke Trusel, Joseph McConnell, Ben Smith, Matthew Evans, Karen Frey, Monica Arienzo, Nathan Chellman

11:15 **DETAILED SEDIMENTOLOGICAL INVESTIGATIONS CHALLENGE OUR UNDERSTANDING OF DEPOSITION IN ARCTIC GLACIATED FJORDS**
Lena Håkansson and Maria Jensen

11:30 **SALTMARSH RECORD OF POST LITTLE ICE AGE MASS BALANCE CHANGES IN SOUTHEAST GREENLAND**
Sarah Woodroffe, Natasha Barlow, Leanne Wake, Kristian Kjeldsen, Anders Bjork, Kurt Kjaer, Antony Long

11:45 **A 400-YR WINTER TEMPERATURE RECONSTRUCTION FROM THE HIGH ARCTIC USING VARVED LAKE SEDIMENTS**
Benjamin Amann, Scott Lamoureux, Maxime Boreux

12:00 **LUNCH BUFFET PROVIDED** (Davis Hall Atrium)

PM - Thursday March 23

3. Poster Session 1 - 1:00-3:00 pm (Davis Hall Atrium)

Chair: Carolyn Roberts

1 **EVALUATING AND TESTING CLIMATE MODEL SIMULATIONS OF GREENLAND ICE SHEET SNOW AND FIRN DENSITIES**
P. Alexander, L. Koenig, M. Tedesco, P. Kuipers Munneke, X. Fettweis, S. Ligtenberg, B. Noël, M. van den Broeke, C. Miège

2 **MODERN FORAMINIFERAL ASSEMBLAGES IN THE PETERMANN FJORD, NW GREENLAND**
Anne Jennings, Alan Mix, Maureen Walczak , Brendan Reilly, Joe Stoner, Maziet Cheseby

3 **A HIGH-RESOLUTION HOLOCENE MARINE SEDIMENTOLOGICAL RECORD FROM POND INLET, NUNAVUT - IS THERE A PALEOSEISMICITY SIGNAL?**
Laura-Ann Broom, Calvin Campbell, John Gosse

4 **RADIOACTIVE AND STABLE PALEOATMOSPHERIC METHANE ISOTOPES ACROSS THE OLDEST DRYAS-BØLLING TRANSITION FROM TAYLOR GLACIER, ANTARCTICA**
Michael Dyonisius, Vasilii Petrenko, Andrew Smith, Ben Hmiel, Quan Hua, Bin Yang, James Menking, Sarah Shackleton

5 **HOLOCENE AND LAST INTERGLACIAL CLIMATE OF THE FAROE ISLANDS FROM SEDIMENTARY LEAF WAX HYDROGEN ISOTOPES**
Lorelei Curtin, William D'Andrea, Gregory de Wet, Raymond Bradley

6 **A 40-YEAR RECORD OF NORTHERN HEMISPHERE ATMOSPHERIC CARBON MONOXIDE CONCENTRATION AND ISOTOPE RATIOS FROM THE FIRN AT GREENLAND SUMMIT**
Philip Place, Vasilii Petrenko, Isaac Vimont, Christo Buizert, Patricia Lang, Christina Harth, Ben Hmiel, James White

7 **RECENT HYDROLOGICAL RESPONSE OF A GLACIERIZED WATERSHED TO HIGH ARCTIC WARMING, LINNÉVATNET, SVALBARD**
Michael Retelle, Noel Potter, Steve Roof, Al Werner

8 **HYDROCLIMATE RESPONSE TO ABRUPT TEMPERATURE CHANGES DURING THE DEGLACIAL INTERVAL IN NORWAY AND RUSSIA**
Owen Cowling, Elizabeth Thomas, John-Inge Svendsen, Kristian Vasskog

9 **PALEOENVIRONMENTAL RECONSTRUCTION FROM THE SEDIMENT RECORD OF THE VARVED PROGLACIAL LINNÉVATNET, SVALBARD, NORWEGIAN HIGH ARCTIC**
Gwenyth Williams and Michael Retelle

10 **NEW CONSTRAINTS ON THE TIMING AND PATTERN OF DEGLACIATION IN THE HÚNAFLÓI BAY REGION OF NORTHWEST ICELAND USING COSMOGENIC 36CL DATING AND GEOMORPHIC MAPPING**
Amanda Houts, **Joseph Licciardi**, Sarah Principato, Susan Zimmerman, Robert Finkel

11 **PROVENANCE, STRATIGRAPHY, AND CHRONOLOGY OF HOLOCENE TEPHRA ARCHIVED IN LAKE SEDIMENT FROM VESTFIRÐIR (NW), ICELAND**
David Harning, Thorvaldur Thórdarson, Kate Zalzal, Áslaug Geirsdóttir, Gifford Miller

12 **LATE SEASON HIGH-SEDIMENTATION EVENTS AND ANNUAL SEGMENT FLUX IN SEDIMENT FLUX IN A SEDIMENT TRAP RECORD FORM LINNÉVATNET, SVALBARD**
Noel Potter and Michael Retelle

13 **UNDERSTANDING THE PRODUCTION AND RETENTION OF IN SITU COSMOGENIC 14C IN POLAR FIRN**
Ben Hmiel, Vasilii Petrenko, Michael Dyonisius, Andrew Smith, J. Schmitt, Christo Buizert, Philip Place, Christina Harth, R. Beaudette, Quan Hua, Bin Yang, Isaac Vimont, M. Kalk, R.F Weiss, J.P. Severinghaus, Ed Brook, James White

14 **LATE WISCONSINAN GLACIAL DYNAMICS IN BROUGHTON TROUGH AND MERCHANT'S BAY, CENTRAL-EASTERN BAFFIN ISLAND**
Pierre-Olivier Couette, Patrick Lajeunesse, Etienne Brouard

15 **RECONSTRUCTING THE QUEBEC-LABRADOR SECTOR OF THE LAURENTIDE ICE SHEET FROM NEW SURFICIAL GEOLOGY MAPS, TILL PROVENANCE, AND DETRITAL 10BE DATA**
Jessey M. Rice, Martin A. Ross, Roger C. Paulen

16 **PROGLACIAL LAKE SEDIMENT RECORDS OF HOLOCENE MOUNTAIN GLACIER CHANGE ON THE NUUSSUAQ PENINSULA, WEST GREENLAND: INITIAL RESULTS**
Avriel Schweinsberg, Jason Briner, Joseph Licciardi, Ole Bennike

17 **GLACIAL HISTORY AND GEOMORPHOLOGY OF TRYGGHAMNA, WESTERN SPITSBERGEN**
Nína Aradóttir, Ólafur Ingólfsson, Anders Schomacker, Lena Håkansson, Riko Noormets

18 **CONSTRAINTS ON WESTERN GREENLAND ICE SHEET EXTENT DURING THE MIDDLE HOLOCENE FROM PROGLACIAL THRESHOLD LAKES**
Alia Lesnek, Jason Briner, Heidi Roop, Allison Cluett, Elizabeth Thomas, Nicolás Young

19 **LAKE WATER ISOTOPIC VARIABILITY IN WESTERN GREENLAND: IMPLICATIONS FOR PALEOHYDROLOGICAL STUDIES**
Allison Cluett and Elizabeth Thomas

20 **NEW COSMOGENIC RADIONUCLIDE DATA CONSTRAIN THE FREQUENCY OF DISAPPEARANCE OF THE GREENLAND AND LAURENTIDE ICE SHEETS THROUGH THE FULL QUATERNARY**
Gifford Miller, Simon Pendleton, Joerg Schaefer, Nicolas Young, Jason Briner, Adrien Gilbert, Gwenn Flowers

2:30 **TREATS AND POSTERS**

4. Arctic Paleoclimate - Talks

Chair: Elizabeth Thomas

3:00	**SOIL DEPOSITS RECORD HOLOCENE CLIMATE AND LANDSCAPE DISTURBANCE IN THE HIGHLANDS OF ICELAND** **Darren Larsen**, Dervla Meegan Kumar, Áslaug Geirsdóttir, Gifford Miller
3:15	**PLIO-PLEISTOCENE CIRCULATION AND SEA ICE HISTORY IN THE WESTERN ARCTIC OCEAN, BASED ON A NORTHWIND RIDGE SEDIMENT RECORD** **Geoffrey Dipre**, Leonid Polyak, Joe Ortiz, Emma Oti, Anton Kuznetsov
3:30	**DEGLACIAL – HOLOCENE PALEOCEANOGRAPHY OF HERALD CANYON, CHUKCHI SEA** **Christof Pearce**, Matt O'Regan, Jayne Rattray, David Hutchinson, Igor Semiletov, Martin Jakobsson
3:45	**INVESTIGATING GLACIAL- INTERGLACIAL ENVIRONMENTAL CHANGES DURING THE MID- TO LATE- PLEISTOCENE: A BIOGEOCHEMICAL RECORD FROM LAKE EL'GYGYTGYN, RUSSIA** **Helen Habicht**, Isla Castañeda, Julie Brigham-Grette
4:00	**THE BIG THAW: TRANSDISCIPLINARY EXPLORATIONS OF PROFOUND TRANSFORMATION THROUGHOUT THE ARCTIC DUE TO CLIMATE CHANGE** **Connolly, Kim Diana**

5. Invited Talk: Isla Castañeda

Chair: Elizabeth Thomas

4:15	**MID- TO LATE-PLEISTOCENE TEMPERATURE AND ENVIRONMENTAL VARIABILITY AT LAKE EL'GYGYTGYN, FAR EAST RUSSIA** **Isla Castañeda**, Helen Habicht, Molly Patterson, Gregory de Wet, Benjamin Keisling, Rob DeConto, Julie Brigham-Grette

5:00-5:30 **HAPPY HOUR** (Davis Hall Atrium)

5:30 Keynote Talk

"Paleoclimate data assimilation: the next frontier in getting the best science from ice core, sediment, and other high-resolution proxy data"

by

Eric Steig

Earth and Space Sciences
University of Washington

Followed by the Workshop Banquet Dinner (provided)

AM - Friday March 24

8:30-8:55	Load presentations onto computer, take down posters, put up posters	Davis Hall Atrium
8:55-9:00	**Announcements** Jason Briner, Chair of Organizing Committee	Davis Hall 101

6. Glacier Dynamics 1 - Talks

Chair: Beata Csatho

9:00	**RAPID THINNING AND ACCELERATION AT THE COLD-BASED VAVILOV ICE CAP, SEVERNAYA ZEMLYA, RUSSIA** Michael Willis, **Matthew Pritchard**, Whyjay Zheng, William Durkin IV, Joan Ramage, Julian Dowdeswell, Toby Benham, Robin Bassford
9:15	**MONITORING LAND-ICE ELEVATION CHANGES IN FRANZ JOSEF LAND USING REMOTE SENSING** **Whyjay Zheng**, Matthew Pritchard, Michael Willis
9:30	**A SEISMIC PERSPECTIVE ON THE EVOLUTION OF THE NW GREENLAND ICE SHEET** **Paul Knutz**, Ulrik Gregersen, Karen Dybkjær, Emma Sheldon, John Hopper
9:45	**EVIDENCE FOR THE DRAINAGE OF A SUPRAGLACIAL LAKE AS THE SOURCE OF SEISMIC WAVES RECORDED AT REGIONAL DISTANCE** **Erik Orantes**, Patricia Kenyon, Patrick Alexander, Marco Tedesco
10:00	**THE CONTRIBUTION OF TOPOGRAPHIC SHADOWING BY ICE ON THE ALBEDO VARIABILITY** **Sasha Leidman**, Asa Rennermalm, Johnny Ryan, Dimitri Acosta
10:15	**HYDRAULIC CONDUCTIVITY AS A PROXY FOR DRAINAGE SYSTEM CONNECTIVITY IN A SUBGLACIAL HYDROLOGY MODEL** **Jacob Downs**, Jesse Johnson, Joel Harper, Toby Meierbachtol

10:30 **COFFEE BREAK** (Davis Hall Atrium)

7. Glacier Dynamics 2 (+ hazards) - Talks

Chair: Jesse Johnson

11:00	**LOCAL PROCESSES AND REGIONAL PATTERNS - INTERPRETING A MULTI-DECADAL ALTIMETRY RECORD OF GREENLAND ICE SHEET CHANGES** **Bea Csatho**, Toni Schenk
11:15	**DETAILED SURFACE ELEVATION RECONSTRUCTION OF HELHEIM GLACIER (1981-2016)** **Carolyn Roberts**, Beata Csatho, Toni Schenk
11:30	**COUPLED CHANGES IN THE CRYOSPHERE AND SOLID EARTH MEASURED BY SPACE GEODESY** **William Durkin IV** and Matthew Pritchard
11:45	**GEOLOGICAL HAZARD ASSESSMENT IN WESTERN BAFFIN BAY-APPROACHES AND PRELIMINARY RESULTS** **Calvin Campbell**, Kimberley Jenner, Kevin MacKillop, David Piper, Meaghan MacQuarrie, Laura Broom
12:00	**LUNCH BUFFET PROVIDED** (Davis Hall Atrium)

PM - Friday March 24

8. Poster Session 2 - 1:00-3:00 pm (Davis Hall Atrium)

Chair: Avy Schweinsberg

1 **ON THE CONTRIBUTION OF BAFFIN BAY ICE COVER AND SEA SURFACE TEMPERATURES TO GREENLAND'S WEST COAST WARMING**
Thomas Ballinger, Edward Hanna, Richard Hall, Jeffery Miller, Mads Ribergaard, Jacob Høyer

2 **FINAL DEGLACIATION AND MARINE INCURSION: A VIEW FROM WESTERN HUDSON BAY**
Samuel Kelley, M.S. Gauthier, M. Ross, T.J. Hodder

3 **EARLY HOLOCENE GLACIER CHRONOLOGIES FROM BAFFIN ISLAND, ARCTIC CANADA**
Sarah Crump, Gifford Miller, Nicolás Young, Jason Briner, Simon Pendleton

4 **A MID-LATE HOLOCENE MULTI-PROXY PALEOENVIRONMENTAL RECONSTRUCTION OF NORTHERN FINNMARK USING A SEDIMENT CORE FROM THE ISLAND OF INGØY, NORWAY**
Claire Markonic, Michael Retelle, Alan Wanamaker

5 **TESTING THE ICE COVER HISTORY OF PRESERVED LANDSCAPES ON BAFFIN ISLAND USING 14C**
Simon Pendleton, Gifford Miller, Nathaniel Lifton, Robert Anderson

6 **DETERMINING AND INTERPRETING DETAILED ICE SURFACE ELEVATION CHANGES OF THE GLACIERS IN UPERNAVIK ISSTRØM, NORTHWEST GREENLAND, 1981-2014**
Lindsay Wendler, Beata Csatho, Toni Schenk

7 **CHANGES IN LAKE ICE PHENOLOGY AT LINNÉVATNET, A FRESH WATER LAKE IN THE HIGH ARCTIC OF SVALBARD**
Lea Maria Frederiksen

8 **IMPLICATIONS FOR INTERPRETING LEAF WAX PALEOCLIMATE PROXIES IN ECOSYSTEMS WITH STRONG SEASONAL CYCLES USING OBSERVED SEASONAL TRENDS OF ENVIRONMENTAL WATER AND SEDIMENTARY LEAF WAX HYDROGEN ISOTOPES IN CENTRAL NEW YORK**
Megan Corcoran, Elizabeth Thomas, David Boutt

9 **A HIGH-RESOLUTION APPROACH TO EVALUATE THE OCCURRENCE OF VARVED SEDIMENTS IN LAKE WALKER, QUÉBEC NORTH SHORE, USING IMAGE ANALYSIS AND X-RAY MICROFLUORESCENCE**
Obinna Nzekwe, Pierre Francus, Guillaume St-Onge, Patrick Lajeunesse, David Fortin, Antoine Gagnon-Poiré, Edouard Philippe

10 **SURFACE STATUS ACROSS SCALES - EVALUATING TEMPORAL AND SPATIAL PATTERNS IN FREEZE/THAW CYCLES**
Helena Bergstedt and Annett Bartsch

11 **DEVELOPMENT OF AN INTENSIVE HYDROLOGICAL MONITORING PROGRAM TO EVALUATE VULNERABILITY OF MACKENZIE DELTA REGION LAKES TO CLIMATE CHANGE**
Evan Wilcox, Philip Marsh, Branden Walker, Philip Mann

12 **CLIMATE VARIATIONS OF THE COAST OF LABRADOR, 1750-1950 : A DISCURSIVE APPROACH**
Marie-Michèle Ouellet-Bernier, Anne de Vernal, Daniel Chartier

13 **CENTENNIAL SCALE VARIATIONS OF SEA-SURFACE IN THE DISKO BUGT, WEST GREENLAND**
Estelle Allan, Anne de Vernal, Mads Faurschou Knudsen, Matthias Moros, Sofia Ribeiro, Marie-Michèle Ouellet-Bernier, Henry Maryse

14 **MARINE EVIDENCE FOR COLLAPSES OF THE ARCTIC SECTOR OF THE LAURENTIDE ICE SHEET IN THE WESTERN ARCTIC OCEAN DURING THE LAST GLACIAL CYCLE**
Kenta Suzuki, Masanobu Yamamoto, Tomohisa Irino, Seung-II Nam, Leonid Polyak, Takayuki Omori, Toshiro Yamanaka

15 **GEOGRAPHIC VARIATION OF CIRQUES ON ICELAND: FACTORS INFLUENCING CIRQUE MORPHOLOGY**
Heather Ipsen, Sarah Principato, Rachael Grube, Jessica Lee

16 **MODELING THE EVOLUTION OF SUPRAGLACIAL RIVER NETWORKS OVER SOUTHWEST GREENLAND**
Rohi Muthyala and Asa Rennermalm

17 **ONE THOUSAND YEARS OF NORTH ATLANTIC SEA-SURFACE VARIABILITY PORTRAYED IN AN ARRAY OF PAN-ARCTIC ICE CORE METHANESULFONIC ACID (MSA) RECORDS**
Matthew Osman, Sarah Das, Luke Trusel, Joseph McConnell, Matthew Evans

18 **RECONSTRUCTING THE GLACIAL HISTORY OF MIDTRE LOVÉNBREEN, SVALBARD**
Erik Holmlund and Lena Håkansson

2:30 **TREATS AND POSTERS**

9. Alaska Paleoclimate - Talks

Chair: Jason Briner

3:00	**PALEOGENETIC SURVEY OF BROWN AND BLACK BEAR DIVERSITY IN PLEISTOCENE SOUTHEAST ALASKA** **Charlotte Lindqvist**, Tianying Lan, Sandra Talbot, Joseph Cook, Timothy Heaton
3:15	**THE LAST DEGLACIATION OF THE REVELATION MOUNTAINS, ALASKA: DISTINGUISHING BETWEEN GLOBAL AND REGIONAL CLIMATIC CONTROLS** **Joseph Tulenko**, Jason Briner, Nicolás Young
3:30	**A TEST OF INTRINSIC CLIMATE VARIABILITY AS THE CAUSE OF LATE HOLOCENE VALLEY GLACIER FLUCTUATIONS** **David Barclay**, Brian Luckman, and Gregory Wiles
3:45	**RECONSTRUCTING SOUTHEAST ALASKA'S RELATIVE SEA LEVEL HISTORY FROM RAISED SHELL-BEARING STRATA AND NARROWING THE TIMING OF THE RETREAT OF THE CORDILLERAN ICE SHEET FROM THE ARCHIPELAGO TO NEAR 13.700 CAL. BP** **James Baichtal**, Risa Carlson, Jane Smith, Dennis Landwehr

10. Invited Talk: Gifford Miller

Chair: Jason Briner

4:00	**AN ARCTIC PERSPECTIVE ON CONTEMPORARY WARMING** **Gifford Miller**

5:00 **HAPPY HOUR** Workshop photo & John Andrews toast

STUDENT PARTY – DETAILS TO BE ANNOUNCED.
EVERYBODY ELSE – DINNER ON YOUR OWN!

END OF WORKSHOP

OPTIONAL FIELD TRIP TO NIAGARA FALLS DEPARTS **9 AM, SATURDAY, MARCH 25**, FROM SPOT COFFEE IN WILLIAMSVILLE


47th International Arctic Workshop participants are invited to submit papers to
Arctic, Antarctic, and Alpine Research
An Interdisciplinary Journal
Arctic, Antarctic, and Alpine Research specializes in publishing interdisciplinary papers synthesizing cold regions research in a variety of disciplines - ecology, paleoecology, climatology, geomorphology, glaciology, hydrology, oceanography, atmospheric chemistry, biogeochemistry, and social science.
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GEOGRAPHIC VARIATION OF CIRQUES ON ICELAND: FACTORS INFLUENCING CIRQUE MORPHOLOGY

Ipsen, Heather A.[1], Principato, Sarah M.[2], Grube, Rachael E.[2], Lee, Jessica F.[3]

[1]Department of Earth Sciences, Syracuse University
[2]Department of Environmental Studies, Gettysburg College
[3]Department of Geological Sciences, University of Delaware

Cirques are one of the most common glacial landforms in alpine settings. They also provide important paleoclimate information (e.g. Meierding 1984; Evans 2006). The purpose of this study is to fill in gaps in the climate record of Iceland by conducting a quantitative analysis of cirques in three regions in Iceland: Tröllaskagi, the East Fjords, and Vestfirðir. Iceland, located in the center of the North Atlantic Ocean, contains many small glaciers, in addition to large ice caps. The glaciers on Iceland are particularly sensitive to variations in oceanic and atmospheric circulation (Andresen et al. 2005; Geirsdóttir et al., 2009; Ólafsdóttir et al. 2010). Iceland thus provides an excellent case study to examine factors influencing glacial landforms such as cirques.

Our study identifies at least 483 cirques using Google Earth and the National Land Survey of Iceland Map Viewer. We use ArcGIS to measure length, width, aspect, latitude and distance to coastline of each cirque. A slope raster is constructed from the first derivative of the Digital Elevation Model (DEM) of the study area in order to determine the location of the headwall, cirque floor, and toewall of each cirque. Paleo-equilibrium-line altitudes (ELAs) of paleo-cirque glaciers are calculated using the altitude-ratio method, the cirque floor method, and a minimum point method (e.g. Meierding 1982; Porter 2001; Principato and Lee 2014). We compute average aspect using an inverse tangent function based on lines constructed for the altitude-ratio method.

The mean paleo-ELA values in Tröllaskagi, the East Fjords, and Vestfirðir are approximately 788 m, 643 m, and 408 m, respectively. Interpolation maps of ELA distributions in all three regions demonstrate a positive relationship between paleo-ELA and distance to coastline. There is a negative relationship between paleo-ELA and latitude in Tröllaskagi and Vestfirðir, but no relationship exists in the East Fjords. The modal orientation of the cirques in Tröllaskagi and Vestfirðir is northeast, while the orientation of cirques in the East Fjords is north. Paleo-wind reconstructions for the LGM show that modal aspect aligns opposite prevailing wind directions in each of the three regions (Bush and Philander 1999). Cirque length is similar in Tröllaskagi and the East Fjords, but cirques are approximately 200 m shorter in Vestfirðir. Cirque widths are similar in all three regions. Comparisons with a global dataset of cirque analyses compiled by Barr and Spagnolo (2015) show that cirques in Iceland are generally smaller and more circular in shape than cirques in other regions of the world. However, cirques on Iceland are particularly comparable to those in Kamchatka, Russia, likely due to similarities in study site characteristics (e.g. influence of ocean currents and location on a volcanically active island).

Our results are significant because they reiterate the idea that access to a moisture source is key in determining ELA elevation (Principato and Lee 2014; Barr and Spagnolo 2015). Cirque aspect is influenced by wind direction, and cirque size and shape depends on bedrock structure. The difference in cirque morphometry on Iceland and globally is indicative of the importance of specific local weather conditions in dictating the formation and characteristics of glacial landforms. As previous research has shown (e.g. Barr and Spagnolo 2015; Delmas et al. 2015), this study also demonstrates that cirques are complex landforms that cannot likely be explained by a single definitive relationship between their formation processes and structure.

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