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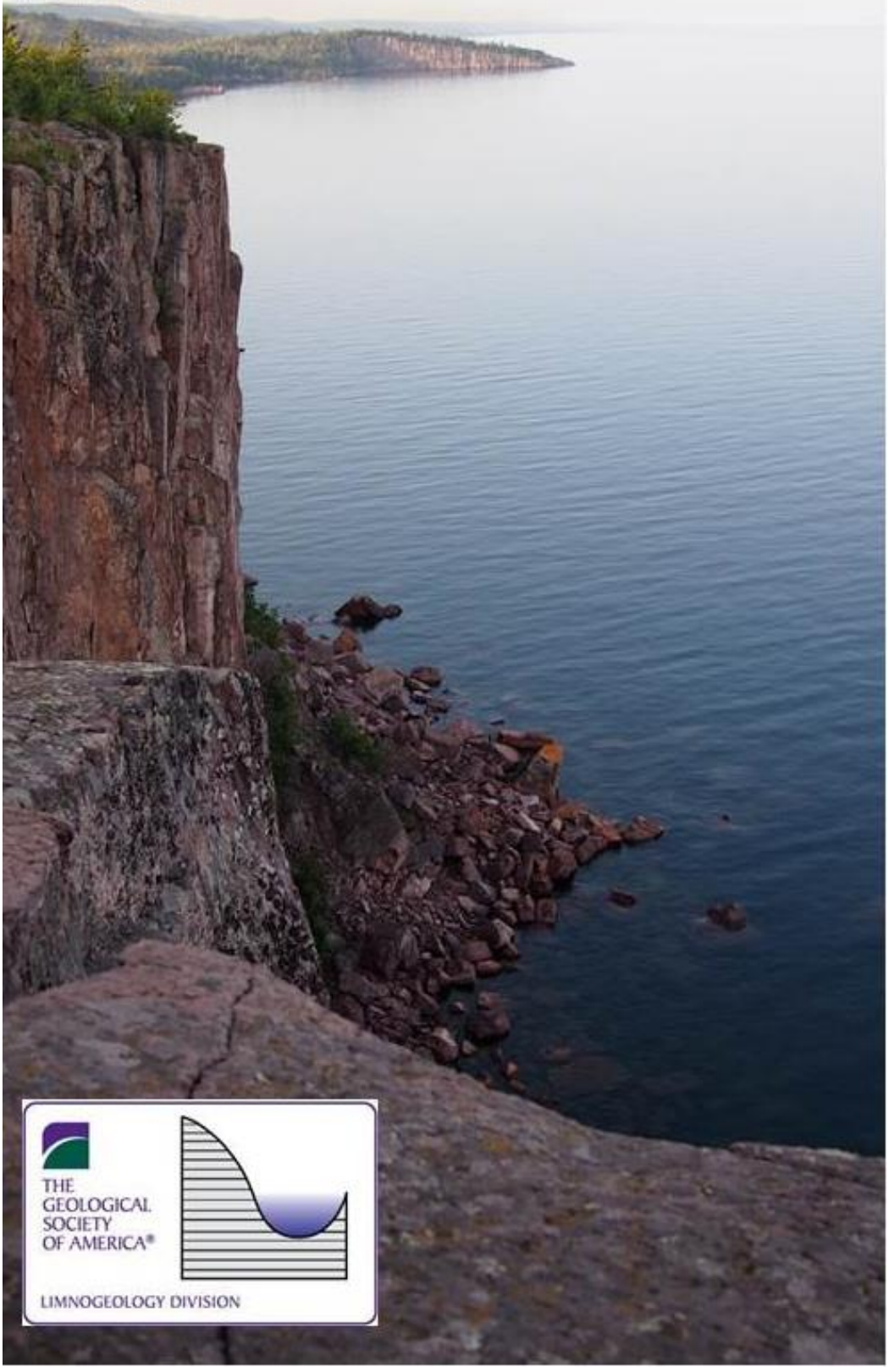

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CONTENTS

From the Editor

Michelle Goman

Rohnert Park, CA

Welcome to the Fall 2013 edition of the Limnogeology Newsletter!

This edition of the Newsletter begins with a message from our division chair, Amy Myrbo. It contains a list of sessions for the upcoming 125th Annual GSA Meeting in Denver, and other informational items including:

- An article by Kerry Kelts awardee Elizabeth K. Thomas
- The citation for 2012 Russell Awardee Tim Lowenstein
- A list of upcoming limnogeology-related meetings

Don't forget to send me your news items!

Michelle (goman@sonoma.edu)

Cover Photo: Lake Superior from Pallisade Head, near Finland, MN (photograph by Amy Myrbo)

Message from the Chair

Amy Myrbo
Minneapolis, MN

This newsletter will be hitting you all in the pre- and syn-GSA frenzy, so just take a moment to mark your calendars for a few Limnogeology Division events at the meeting. First, please stop by our booth (#1117) in the exhibit hall anytime, but especially at the exhibits opening reception, Sunday from 5-7 PM. Meet the current and past Division officers, pick up a Division sticker, buy a great 10th Anniversary t-shirt, and get information about the Division and how you can be involved. (This Chair will be monitoring updates on the Green Bay-Minnesota game in between shaking hands!). Second, plan to attend the Division reception on Tuesday night from 6-8 PM in Mile High Ballroom 1AB. It used to be called simply the "business meeting," but we found that didn't exactly attract a crowd. So this year it's called the "Sedimentary Geology Division, Limnogeology Division, and Society for Sedimentary Geology (SEPM) Party: Joint Annual Business Meeting and Awards Ceremony with free food and cash bar." (GSA encourages us to get *all* the pertinent information into the title of the event so it's listed that way in the program!) Contributions from the three sponsoring organizations will provide some substantial food, as well as drink tickets for attending students (while they last!). There will also be a drawing for students, with the usual great prizes donated by publishers and others. Please contact me if you would like to donate a prize. And speaking of prizes, at the reception we will be making two award presentations: the I.C. Russell Award, the Division's highest honor, to Kevin Bohacs of ExxonMobil and former Division Chair; and the Kerry Kelts Student Research Award to Audrey Blakeman from Ohio University for her work on the petrography of the Bridger B limestones of the Green River Formation.

Last Chance on the Caption Challenge…

What is Amy thinking? Submit captions to Newsletter editor, Michelle Goman (goman@sonoma.edu). Results will be made public at the annual meeting!

Third, and most important, please plan to attend student presentations at the meeting! These are often concentrated in poster sessions, such as Lacustrine Basin Analysis and and Petroleum Systems (posters), T137, and Lakes and Lake Deposits on Earth and Mars (posters), T65, both on Monday, and Continental Carbonates (posters), T193, and World of Lakes (posters), T68, both on Wednesday. Talking to students about their projects – sharing our excitement, making them feel like part of the community – is perhaps the most important thing we can do for the future of the field. Students who present at GSA come from many different academic backgrounds, and Limnogeology welcomes all of them, encouraging synthesis of multiple disciplines. Showing students that there is a place here for their science and interests can be a huge boost for a student's confidence and enthusiasm.

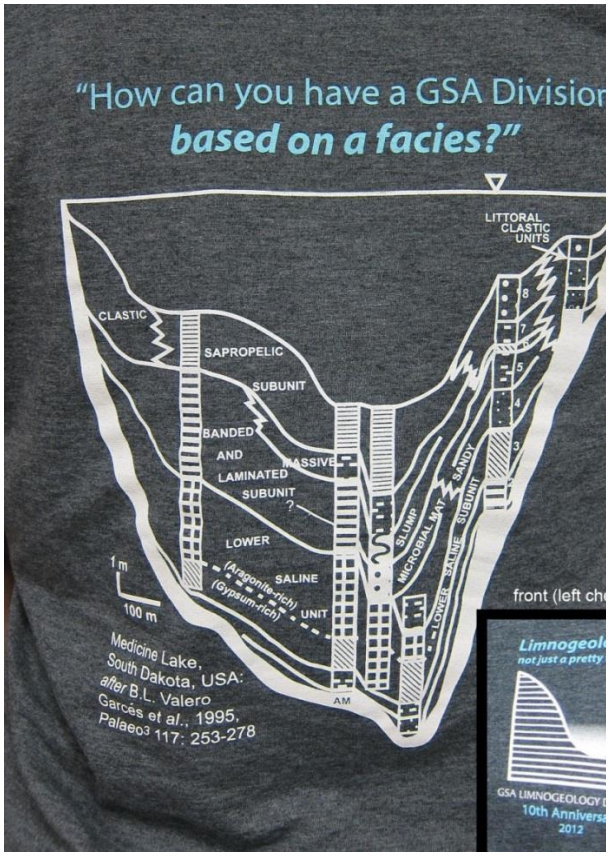
I'm really excited about this Annual Meeting. The Division is offering a great slate of chock-full sessions, and it will be one of the biggest GSA meetings ever! Please introduce yourself, or say hi, when you see me at the meeting, and encourage your students to do the same!

See you in Denver,

Amy Myrbo

Limnogeology Division Chair

BE CHIC, BE SEEN IN A LIMNOGEOLOGY T-SHIRT !



Limnogeology Division 10th Anniversary t-shirts are available now! All proceeds go to the Kerry Kelts Fund for Student Research. Shirts will be available from the division booth at the upcoming meeting in Denver or they can be purchased on line. Shirts are $20 including shipping and can be purchased at LacCore.org (click on "T-shirts" on the left). Sizes are S-M-L-XL-2XL. If you wish to pay by check, contact Amy Myrbo (amyrbo@umn.edu).

Generating a quantitative record of Holocene terrestrial climate on western Greenland to decipher mechanisms controlling ice sheet discharge and sea level rise

Elizabeth K. Thomas (Brown University Department of Geological Sciences)

2012 Kerry Kelts Award Winner

Introduction

Predictions of Greenland Ice Sheet (GIS) contributions to sea level rise by 2100 AD range from 5-50 cm (Long, 2009). This large range in predictions is due to a limited understanding of the mechanisms that drive outlet glacier discharge: dynamic thinning, oceanography, and local climate (Holland et al., 2008; Pritchard et al., 2009). Despite recent advances in understanding ice margin dynamics and oceanography (Moros et al., 2006; Young et al., 2011a, 2011b), a lack of quantitative terrestrial climate records near GIS margins makes it difficult to decipher which mechanisms dominate GIS discharge. We are using leaf wax hydrogen isotopes (d^2H_{wax}) preserved in lake sediments to produce a Holocene summer temperature record (Shanahan et al., 2013; Thomas et al., 2012) for western Greenland (Fig. 1). We are working with glacial geologists at the University at Buffalo to compare our climate reconstruction with records of ice sheet change. This work will improve our understanding of the mechanisms that cause GIS margin change and will aid models that predict future ice sheet and sea level change.

Significance:

Most knowledge about GIS outlet glacier change and the mechanisms that drive outlet glacier change is from contemporary studies that span mere decades (Holland et al., 2008; Joughin et al., 2004; Long, 2009; Pritchard et al., 2009). These observational records indicate that GIS margins are highly sensitive to short-term changes in climate and oceanography. While observational data are important for detailed assessment of ice sheet forcing mechanisms, geological records extend our knowledge of GIS behavior, including climate regimes outside the range of the observational record. Geological evidence indicates that the entire western GIS margin responded sensitively to Holocene climate change (Young et al., 2011b), including rapid responses to brief early Holocene cold events recorded in archives throughout the Northern Hemisphere (Young et al., 2011a). Due to a lack of quantitative reconstructions of oceanographic and terrestrial climate change spanning the Holocene, it is unclear whether the observed sensitivity of the GIS margin is due to one or a combination of factors, and what role, if any, ice dynamics played. Recent advances in knowledge of Holocene ice margin dynamics (Kelley et al., 2012; Young et al., 2013) and oceanography (Moros et al., 2006; Perner et al.,

2011) have provided new insights into mechanisms that drive GIS change. There remains a need, however, for quantitative reconstructions (temperature, precipitation) of terrestrial climate.

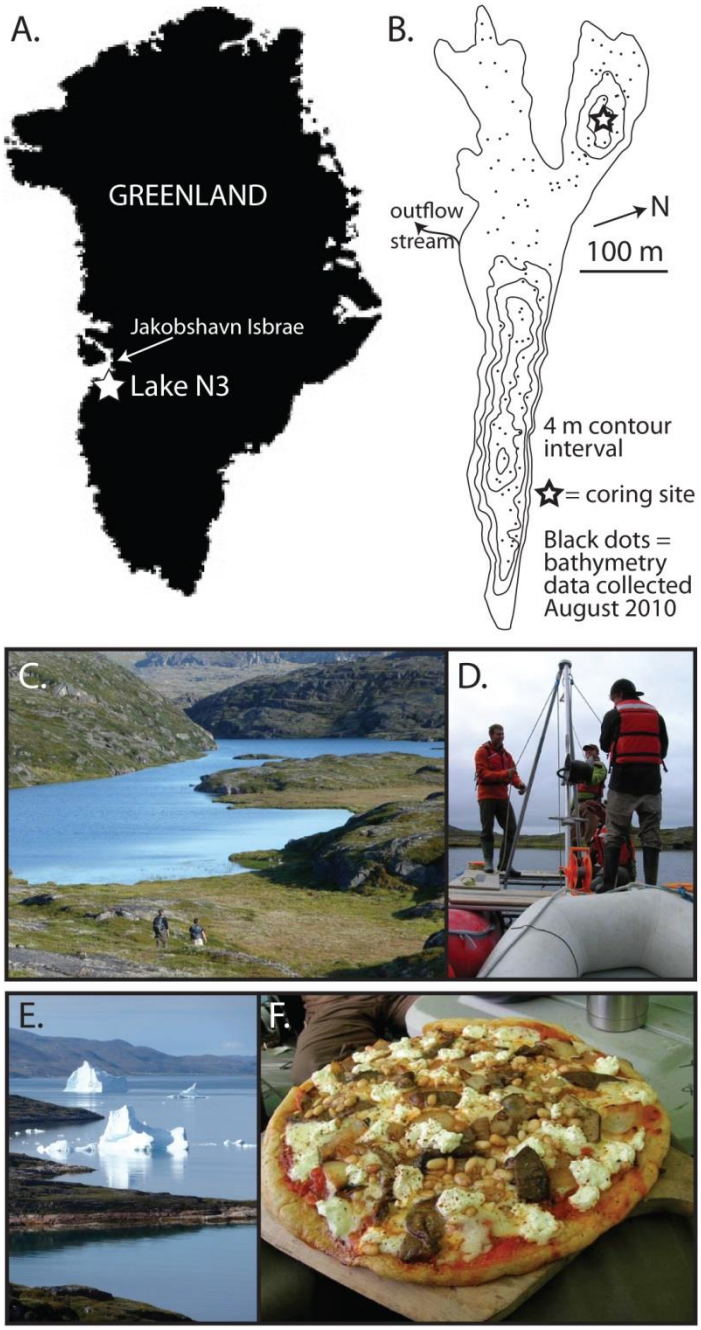


Fig. 1. Lake N3 location. A. Map of Greenland, Lake N3 is in western Greenland 70 km south of the large outlet glacier, Jakobshavn Isbrae. B. Bathymetry map of Lake N3, showing coring site. C. Photo of Lake N3 taken in August 2010. D. N. Young, S. Kelley, and S. Truex coring lake N3 from UB's floating platform in August 2010. E. Icebergs from Jakobshavn Isbrae floating in Disko Bugt, just west of Lake N3. F. We ate well in the field, and pizza nights were especially delicious thanks to our fry-bake pan and fresh mushrooms collected by our mushroom expert, S. Truex.

Current understanding of terrestrial climate on Greenland is based mainly on high resolution temperature records from ice cores (Johnsen et al., 2001; Kobashi et al., 2011), which constrain climate at the GIS summit, rather than at the sensitive margins. Holocene climate records that do exist near the margin of the GIS are mostly derived from lake sediments, and tend to be qualitative (e.g., loss-on-ignition (LOI) as a proxy for primary productivity; Willemse and Törnqvist, 1999), with only two published quantitative records on western Greenland (chironomid-inferred summer air temperature, (Axford et al., 2013); alkenone-inferred lake water temperature, (D'Andrea et al., 2011)). Leaf wax hydrogen isotopes are a useful proxy for temperature and precipitation in a range of climates (Sachse et al., 2012), and recent research has demonstrated that d^2H_{wax} can serve as a proxy for Arctic summer temperature and precipitation source (Shanahan et al., 2013; Thomas et al., 2012). The Kelts Award provided us the ability to produce a centennial-resolution Holocene d^2H_{wax} record for western Greenland, adding to our sparse knowledge of temperature change in this region. Our record will be critical, when combined with geological reconstructions of GIS margin dynamics and oceanography, for understanding the mechanisms that drive GIS discharge and ultimately, GIS contributions to sea level rise.

Methods:

In August 2010, I participated in field work with a research team from the University at Buffalo (UB), led by Dr. Jason Briner, to collect sediment cores from Lake N3 (Figs. 1 and 2). Lake N3 is situated on western Greenland 20 km west of the present GIS margin and 70 km south of Jakobshavn Isbrae, one of the largest Greenland outlet glaciers. Cosmogenic exposure ages of bedrock near Lake N3 and a basal age from Lake N3 sediments indicate that the GIS retreated out of Lake N3's catchment at 7.9 kyr (Fig. 3). The base of the cores we collected contain silt deposited in the lake when the GIS was in Lake N3's catchment. The silt is overlain by ca. 220 cm of organic-rich sediments, deposited between 7.9 ka and today. Today, the lake lies in a small, lush catchment dominated by the shrubs *Salix* sp., *Betula* sp., and *Vaccineum* sp., and by the moss *Sphagnum* sp. We brought the cores back to UB, where they were split, described and subsampled.

The UB team developed a detailed chronology for the Lake N3 sediment cores and LOI, biogenic silica, and bulk carbon and nitrogen isotope records (Figs. 2, 3; some records not shown). This multiproxy approach is useful to reconstruct multiple aspects of the complex climate system. The existing records from Lake N3, however, do not provide quantitative constraints on terrestrial climate. I worked with an undergraduate honors thesis student at Brown University, John Ryan-Henry, to analyze d^2H_{wax} in the Lake N3 sediments to generate a quantitative temperature record for this region (Fig. 3).

Precipitation isotopes are powerful climate proxies because they are directly influenced by climatic variables such as atmospheric temperature and precipitation

source (Rozanski et al., 1993). Advances in organic isotope geochemistry (Hilkert et al., 1999) make it possible now to infer precipitation isotopes not only from ice cores, but also from organic compounds contained in sediment archives. Plants use precipitation to synthesize leaf waxes, which are a component of the protective coating produced by land plants (Sachse et al., 2012). Thus, d^2H_{wax} is a proxy for precipitation d^2H. Leaf waxes are well preserved in lake sediments, and d^2H_{wax} has been used successfully to reconstruct precipitation d^2H at low and mid-latitudes (Sachse et al., 2012), and summer temperature and precipitation source area in the Arctic (Thomas et al., 2012; Wilkie et al., 2013).

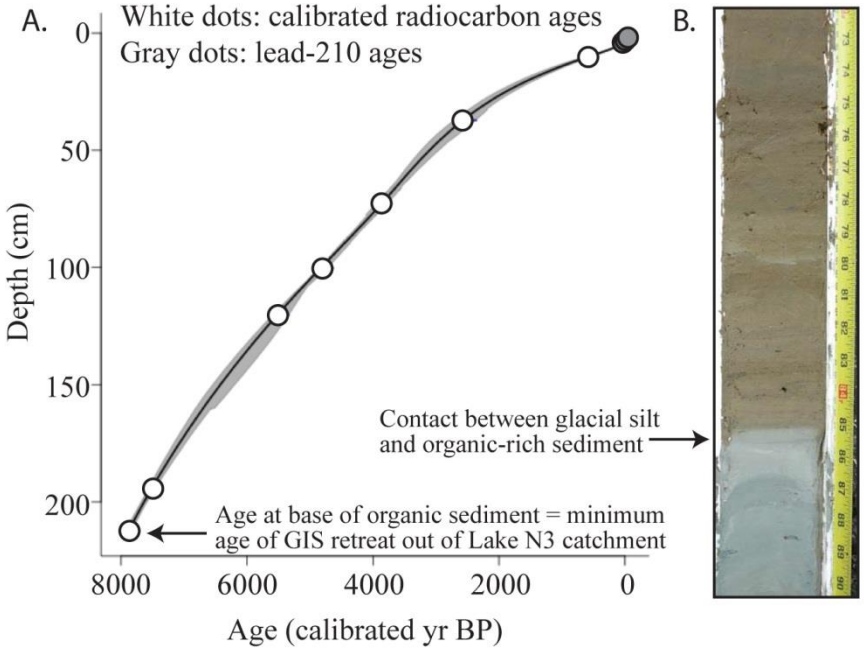


Fig. 2. A. Age-depth model for Lake N3. Radiocarbon ages were calibrated and an age model was developed using *clam* software in the open-source statistical environment R and the IntCal09 calibration curve (Blaauw, 2010; R Development Core Team, 2011; Reimer et al., 2011). B. Photograph of the base of our study core from Lake N3, showing the sharp contact between glacial silt and organic-rich sediments. This contact represents the time when the GIS retreated out of Lake N3's catchment, and GIS melt water was no longer carrying glacial silt to the lake.

John and I extracted, purified, and analyzed leaf waxes from centennial-resolution subsamples of Lake N3 sediments. Plants produce leaf waxes of many different chain lengths, and we can compare the average chain length of leaf waxes in Lake N3 sediments to chain lengths produced by modern plants that I collected and analyzed in 2010 (Fig. 3). The dominant leaf wax in the Lake N3 record is C_{24} *n*-alkanoic acid, corresponding to the dominant chain length produced by shrubs today in the N3 catchment. Aquatic plants also produce the C_{24} *n*-alkanoic acid, however, so we chose to focus our isotopic measurements on the C_{26} and C_{28} *n*-alkanoic acids, which are produced dominantly by terrestrial plants. We used a gas

chromatograph coupled to an isotope ratio mass spectrometer at Brown University to measure compound-specific hydrogen isotopes.

Preliminary Results:

We now have a centennial-scale Holocene d^2H_{wax} record for western Greenland (Fig. 3). We converted the d^2H_{wax} to temperature anomalies relative to 0-2000 AD using a recently published d^2H_{wax}–temperature calibration for Baffin Island (Shanahan et al., 2013). Following retreat of the GIS out of Lake N3's catchment at 7.9 ka, d^2H_{wax} was ca. -165‰, suggesting temperatures up to 4°C warmer than the past two millennia. This is consistent with early Holocene temperatures reconstructed using subfossil chironomids on northeastern Baffin Island (Axford et al., 2009), although loss-on-ignition (LOI) at Lake N3 was low and increasing during this period. LOI has been interpreted as indicating temperature (Willemse and Törnqvist, 1999), but in Lake N3 may also reflect increasing plant cover in the catchment as the freshly deglaciated surface was colonized. Based on average *n*-acid chain length, herbs were likely the dominant plant type during the early Holocene, a finding similar to other western Greenland records based on macrofossils (Bennike, 2000). The rest of the Holocene was likely dominated by shrubs, perhaps with varying amounts of herbs and grasses, and/or varying dominance by *Salix* sp. and *Betula* sp. (Fig. 3).

Between 7 ka and 4.5 ka, d^2H_{wax} was ca. -178‰, indicating temperatures 1 to 2°C warmer than the past two millennia. Glacial geologic and modeling evidence suggests that the GIS reached its minimum Holocene extent during this time period, likely in response to these warm conditions (Simpson et al., 2009; Weidick et al., 2004). From 4.5 ka to 0.7 ka, d^2H_{wax} was ca. -185‰ and had a wide range (20‰); temperatures during this period were similar to the past 2 ka. This is similar to LOI values at Lake N3 and a temperature reconstruction at North Lake, 70 km north of Lake N3, although the timing and variance between these records were slightly different: in the N3 LOI record and at North Lake, cool, stable temperatures were attained ca. 2 and 3 ka, respectively (Axford et al., 2013). These differences may be due to factors, such as precipitation source area, that also influence precipitation d^2H, causing greater variability in d^2H_{wax}.

Both the Lake N3 and North Lake records suggest temperatures ca. 1.5°C cooler than the past two millennia from 0.4 to 0.1 ka, followed by warming to average temperatures at the end of the 20th century. Glacial geological evidence shows that the GIS in the Jakobshavn Isbrae area attained its maximum Holocene extent during the past several hundred years (Briner et al., 2010). Modern observations of Jakobshavn Isbrae show dramatic retreat since the mid-19th century (Csatho et al., 2008). Our temperature record from Lake N3 suggests that the GIS margin near Jakobshavn Isbrae responds rapidly to temperature change.

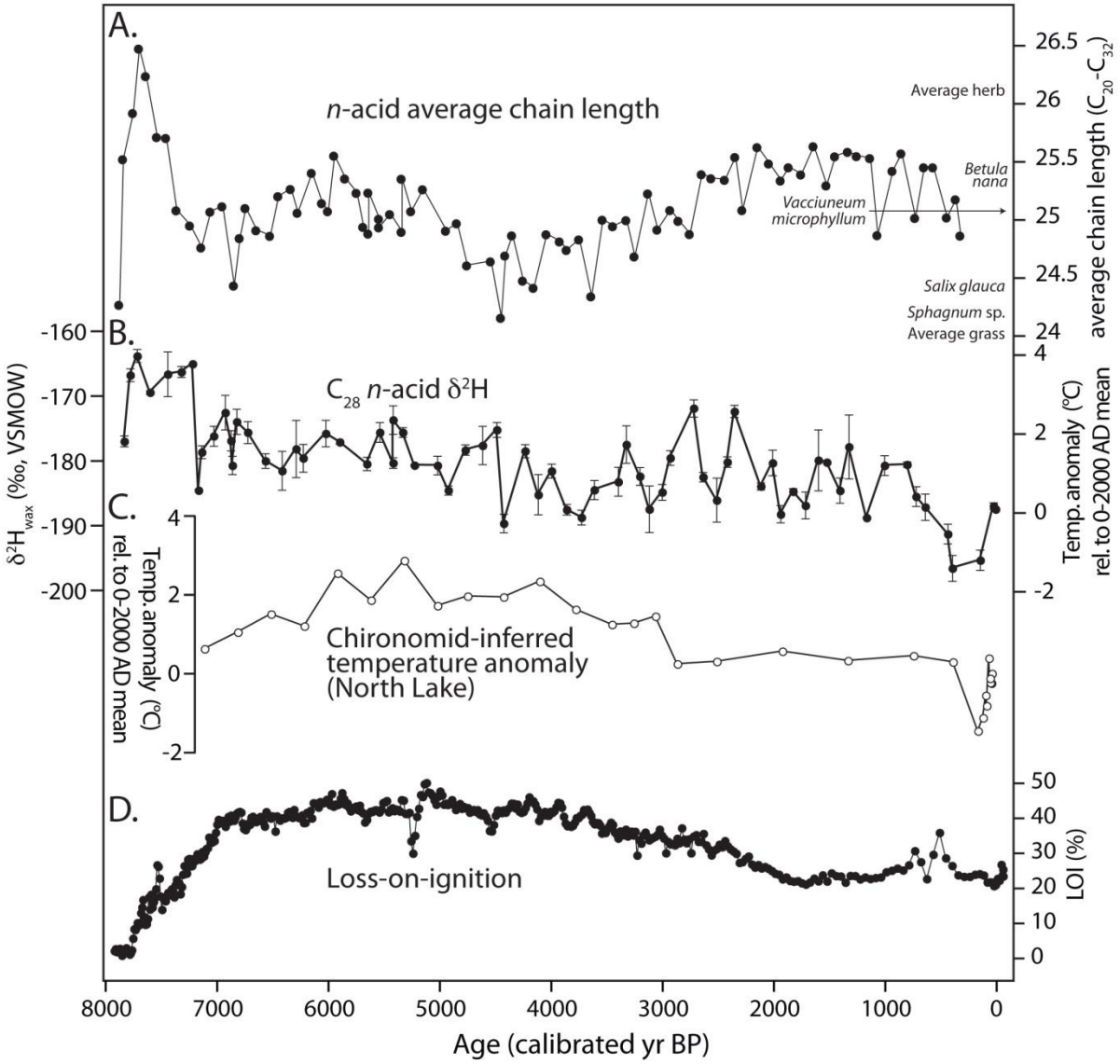


Fig. 3. Western Greenland climate and ecological records. A. Lake N3 average chain length, calculated using C_{20} through C_{32} *n*-acid abundance. Average chain length for modern plants that are abundant in Lake N3's catchment shown next to the y-axis. B. Lake N3 d^2H_{wax} for the C_{28} *n*-acid, 1 s analytical error bars for triplicate measurements shown. C. North Lake chironomid-inferred temperature anomaly, calculated by taking the average of three transfer function models (Axford et al., 2013). D. Lake N3 loss-on-ignition.

Future work:

John Ryan-Henry and I presented these results at the GSA Northeastern Section Meeting at Bretton Woods in NH this past March (Ryan-Henry et al., 2013; Thomas et al., 2013). We are working on writing these data up for publication. We are investigating the effects of precipitation source area on precipitation d^2H, to better understand variability in the d^2H_{wax} record. In the future, independent temperature

and d^2H_{wax} records from the same site will allow us to tease apart the temperature and precipitation source signals contained within d^2H_{wax}.

Acknowledgements:

Thanks to Limnogeology Division of the Geological Society of America for the Kerry Kelts Award. Not only was it an honor, but this award helped move these analyses forward. Thanks to John Ryan-Henry for his interest, enthusiasm, and hard work, Steve Clemens, Yongsong Huang, and Jim Russell for advising and academic support, and Jason Briner for providing samples, data, and academic support. Sam Kelley, Stefan Truex and Nicolás Young provided help in the field and Rafael Tarozo provided lab support. This research was supported in part by a GSA Quaternary Geology and Geomorphology Marie Morisawa Research Award, NSF ARC-909334 to Jason Briner, and NSF EAR-0902805 to Yongsong Huang.

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2013 Kerry Kelts Award

The 2013 Kerry Kelts Student Research Awardee is Audrey Blakeman, from the Department of Geological Sciences at Ohio University. Her project is titled **"Carbonate lake deposits in the fluvial Bridger Formation of the Greater Green River Basin, Wyoming"**. Audrey will be presented with this award at the annual Division Business Meeting on October 29th. Congratulations, Audrey!

Thanks to all the students who submitted proposals, and good luck as you continue your research in Limnology, Paleolimnology, and Limnogeology.

2012 Israel C. Russell Award

The recipient of last year's Russell Award was Tim Lowenstein. The 2013 Israel C. Russell Award winner will be announced at the annual Division Business Meeting on October 29th. We hope to see you there!

Citation by Kathleen C. Benison:

It is a great honor and privilege for me to present the citation for the Israel Cook Russell Award for major contributions to the field of limnogeology to my teacher, friend, and colleague, Dr. Tim Lowenstein.

Tim is the international leader in the fields of chemical sedimentology and brine geochemistry, and for decades has developed and applied new concepts and techniques to chemical sediments to solve significant geological problems. It is fitting that Tim has earned an award commemorating Israel Russell because both are known for their studies of saline lakes in California.

Tim's research program has been driven by significant questions about the Earth that he answers with innovative approaches using brines and evaporites. His work has resulted in enhanced understanding of lithosphere-hydrosphere-atmosphere-biosphere interactions. Tim was among the first to apply comparative sedimentology to evaporites.

Dan Deocampo (past chair Limnogeology Division) presents Tim Lowenstein with the I.C. Russell Award, while Kathleen Benison looks on.

He has pioneered the study of fluid inclusions in halite to interpret past environmental conditions. He has produced paleoclimate records from salt cores in California, the Andes, and China. He has quantified atmospheric CO2 from the Eocene Green River Formation. Tim has addressed the controversial Messinian Salinity Crisis of the Mediterranean. He has traced seawater composition through geologic time. He has isolated, cultured, and identified microorganisms in brines and fluid inclusions in halite. Besides field sites on six continents, Tim has studied chemical sediments on Mars. At an age that technically makes Tim a mid-career scientist, he has published 3 papers in *Science*, 1 paper in *Nature*, and 8 papers in *Geology*. These significant publications are testimonials to the importance of his research to the wider scientific community. I eagerly look forward to Tim's future contributions to the field of geology.

Tim has a sustained record of serving the scientific community. He has been associate editor of *Journal of Sedimentary Research, Geochemical et Cosmochimica Acta*, and *Geology*. He has been a willing and thorough manuscript and proposal reviewer. Tim's distinguished lectureship for the Mineralogical Society of America and participation on NASA steering groups are examples of how he contributes his limnogeological expertise to the wider scientific community.

This citation would be lacking without mention of the profound positive influence that Tim has had on his students and collaborators. Tim 's outstanding teaching and mentoring have enabled his students to become leaders in academia, industry, and government. I consider myself very fortunate to be among the 11 Masters students, 9 PhD students, 3 post-docs, and 2 early-career visiting scholars to date who have worked with, and been inspired by Tim. Tim has had long-term and highly productive working relationships with many collaborators as well. I am certain that all of these students and collaborators value his great friendship as much as his scientific expertise.

It is with great joy that I ask that you join me in congratulating the Limnogeology Division's 2012 Israel Cook Russell awardee, Dr. Tim Lowenstein.

Response by Tim Lowenstein:

My sincere thanks to the Limnogeology Division of the GSA for the Israel C. Russell Award and to Kathy Benison for her citation. It is a great honor to receive this award. I did not grow up on the shores of a lake, not even close. I became interested in lakes as a graduate student at Johns Hopkins where Lawrie Hardie used simple ideas like chemical divides to explain how natural waters in closed basins evolved into brines. At that time, a field trip to the closed basins of California and Nevada opened my eyes, particularly seeing that the zonation of saline minerals and brines in Saline Valley could be explained by chemical principles. Back then, surprisingly, chemical theories were ahead of our knowledge about what evaporites actually looked like, and their potential as paleoenvironmental and paleoclimatic indicators was largely untapped.

The 1990s saw development of techniques for chemical analysis of fluid inclusions, pioneered by geochemists at the University of Barcelona and at Binghamton by Mike Timofeeff. Now we could chemically analyze fossil waters in fluid inclusions and document secular variations in the chemistry of ancient seawater, first considered by Lawrie Hardie and Ron Spencer, and then elegantly modeled by Bob Demicco, using variable river and midocean ridge inflows, not unlike the mixed inflows found in closed basin lakes. The ocean is a large saline lake!

Fluid inclusions in saline minerals are also hosts for microbial life. The discovery of ancient microbial ecosystems trapped inside fluid inclusions in buried halite from Death Valley, along with DNA and living organisms, has been an astonishing surprise. These connections inspired collaborations with microbiologist Russell Vreeland, ecologist Matt Parker, and DNA specialist Koji Lum.

I have many people to thank for teaching me about lakes, modern and ancient, including Joe Smoot, Lawrie Hardie, Alan Carroll, Bob Demicco, Blair Jones, Hans Eugster, Larry Benson, Ron Spencer, Terry Jordan, Linda Godfrey, Paul Baker, Sheri Fritz, Rick Forester, Richard Ku, Shangde Luo, Robin Renaut, Bernie Owen, and Kathy Benison. I am grateful to Colgate professors Bruce Selleck, Rich April, and Jim McLelland for steering me into geology. I want to acknowledge the wonderful graduate students and postdocs I have had: Jianren Li, Chris Brown, Laura Howe, Andy Bobst, Matt Hein and Jonathan Kramer documented closed basin climate records; Enrique Casas, Kathy Schubel, and Lichun Ma studied modern evaporites and brine evolution; Dan Davis and Osama Attia worked on fluid inclusions; Mike Timofeeff, Sean Brennan, Cindy Satterfield, Nora Holt, and Natalie Spear documented ancient seawater chemistry; Brian Schubert, Kat Gragg, Yaicha Winters, Krithi Sankaranarayanan, and Sarah Feiner studied microorganism communities in evaporites; Elliot Jagniecki, John Murphy, and Deidre LaClair work on the Green River Formation; and Kathy Benison and Denise Waite studied burial diagenesis of carbonates.

This is where I will end, with enormous gratitude to Binghamton University and colleagues there, and my wife Sally, for providing the freedom and time to pursue my dreams, and to past and current students and collaborators who find joy in studying lakes.

GSA's 125th Anniversary

CELEBRATING ADVANCES
IN GEOSCIENCE —
Our science, our societal impact, and our
unique thought processes.

Sessions Sponsored by Limnogeology Division at the125th GSA at Denver

http://community.geosociety.org/2013AnnualMeeting/Home

Sunday, 27 October 2013

T65. Lakes and Lake Deposits on Earth and Mars **(**Advocates: Johan Varekamp and Nathalie Cabrol) 8:00 AM-12:00 PM (Colorado Convention Center Room 502)

T66. New or Improved Proxy Methodology for Enhanced Resolution and Accuracy of Climatic and Paleoenvironmental Interpretations in Sedimentary Records (Advocates: Michael Sperazza and Amy Myrbo) 1:00 PM-5:00 PM (Colorado Convention Center Room 501)

Monday, 28 October 2013

T65. Lakes and Lake Deposits on Earth and Mars (Posters)
9:00 AM-6:30 PM (Colorado Convention Center Hall D)
Authors will be present from 9 to 11 AM, and 5:00 to 6:30 PM.

T119. Digital Geology Express **(Digital Posters)**
9:00 AM-6:30 PM (Colorado Convention Center Hall D)
Authors will be present from 2 to 4 PM, and 5:00 to 6:30 PM.

T64. Lacustrine Basin Analysis and Petroleum Systems: Ancient Case Studies, Modern Analogs, New Frontiers **(**Advocates : Michael M. McGlue, Geoffrey Ellis and Shuichang Zhang) 8:00 AM-12:00 PM (Colorado Convention Center Room 502)

T68. World of Lakes (Advocate: Amy Myrbo) 1:00 PM-5:00 PM (Colorado Convention Center Room 501)

Tuesday, 29 October 2013

T193. Continental Carbonates **(**Advocates: Elizabeth Gierlowski-Kordesch and David B. Finkelstein) 1:00 PM-5:00 PM (Colorado Convention Center Room 301)

Wednesday, 30 October 2013

T68. World of Lakes (Posters) 9:00 AM-6:30 PM (Colorado Convention Center Hall D). Authors will be present from 9 to 11 AM, and 5:00 to 6:30 PM.

T193. Continental Carbonates (Posters) 9:00 AM-6:30 PM (Colorado Convention Center Hall D). Authors will be present from 9 to 11 AM, and 5:00 to 6:30 PM.

T124. Geoscience Alliance: Moving Toward Earth Systems Planning for Seven Generations through Broadening the Participation of Native Americans in the Geosciences (Advocates: Nievita Bueno Watts, Diana Dalbotten, Suzanne Zurn-Birkhimer and Amy Myrbo) 1:00 PM-5:00 PM (Colorado Convention Center Room 403).

GSA Limnogeology Division Annual Business Meeting

Tuesday, 29 October 2013: 6:00 PM-8:00 PM
Colorado Convention Center Mile High Ballroom 1AB

GSA Sedimentary Geology Division, GSA Limnogeology Division and Society for Sedimentary Geology (SEPM): Joint Annual Business Meetings and Awards Ceremony with free food and cash bar

Upcoming Meetings

Geological Society of America (GSA) Annual Convention

2014 - Vancouver, British Columbia, Canada: 19–22 October

2015 - Baltimore, Maryland: 1–4 November

2014 GSA Section Meetings

Northeastern Section
23–25 March 2014 - Lancaster, PennsylvaniaAbstract Deadline: 12/10/2013

Southeastern Section
10–11 April 2014 - Blacksburg, Virginia
Abstract Deadline: 1/7/2014

South-Central Section
17–18 March 2014 - Fayetteville, Arkansas
Abstract Deadline: 12/3/2013

North-Central Section
24–25 April 2014 - Lincoln, Nebraska
Abstract Deadline: 1/14/2014

Rocky Mountain & Cordilleran Section Joint Meeting
19–21 May 2014 - Bozeman, Montana
Abstract Deadline: 2/11/2014

North American Lake Management Society (NALMS)

October 30 - November 1, 2013

The **33rd International Symposium of the North American Lake Management Society** will take place in San Diego, California, USA.
NALMS 33rd International Symposium

The website is: http://www.nalms.org/home/conferences-and-events/nalms-upcoming-symposium/nalms-symposium.cmsx

Association of American Geographers (AAG) Annual Meeting

April 8-12th 2014 Tampa, Florida

http://www.aag.org/cs/annualmeeting

Numerous sessions organized by the Paleoenvironmental Change Specialty Group. Abstracts due December 3rd 2013. Limnogeologists encouraged to participate! For more information please contact Limnogeology division secretary Michelle Goman.

International Lake Environment Committee (ILEC)

September 1st – 5th, 2014

The **15th World Lakes Conference (WLC15)** will be held in Perugia, Umbria, Italy. The conference theme is *Lakes, the Mirrors of the Earth: Balancing Ecosystem Integrity and Human Wellbeing*.
The ILEC website is http://www.ilec.or.jp/en/

International Limnogeology Congress 2015 (ILIC6)

June 15th – 19th, 2015

The International Association of Limnogeology (IAL) will hold its Quadrennial International Limnogeology Congress (ILIC6), at the Peppermill Resort Hotel in Reno, Nevada.

The ILIC6 website http://ilic6.org/

International Paleolimnology Association (IPA)

Mid-August 2015

The **13th International Paleolimnology Symposium** of the International Paleolimnology Association will take place in **Lanzhou, China**. An abstract deadline has not yet been posted.

The IPA Symposium website is: http://www.paleolim.org/index.php/symposia/

American Society of Limnology and Oceanography (ASLO)

2014 ASLO Ocean Sciences Meeting (Feb 23-28, 2014)

The Ocean Sciences Meeting of the American Society of Limnology and Oceanography will be held in Honolulu, HI, 2014.

2014 ASLO Summer Conference (May 18-23, 2014)

The summer conference of the American Society of Limnology and Oceanography will be held in Portland, OR. The website listing all these conferences is: http://www.aslo.org/meetings/aslomeetings.html

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Go to the Limnogeology Division website at:

http://rock.geosociety.org/limno/index.html

To get the latest information on other Limnogeology meetings and workshops…

David Warburton, Webmaster

If you don't have access to our website, please contact a Division officer for a list of meetings.

If you have any news, photos, articles, upcoming conferences and recent publications, you would like to share with the division, please submit it to Michelle Goman at goman@sonoma.edu

End Photo: 1.1 billion year old lake sediments, overlain by the first flow of the North Shore Volcanic Group near Duluth, MN. Note the soft sediment deformation! (photo by Amy Myrbo)