A Complex Relationship Between Calving Glaciers and Climate

Many terrestrial glaciers are sensitive indicators of past and present climate change as atmospheric temperature and snowfall modulate glacier volume. However, climate interpretation based on glacier behavior requires careful selection of representative glaciers, as was recently pointed out for surging and debris-covered glaciers, whose behavior often defies regional glacier response to climate forcing.

In this context, it is important to compare the different roles played by climate forcing in advancing versus retreating terminal moraines and redeposit sediment advance rate is limited by sediment supply and glacier thinning (which alters flow and calving rates).

Sustained advance inherently enhances the ablation zone, reducing the AAR and slowly increasing the glacier's sensitivity to climate cycles and regimes. Advances can persist for centuries, but eventually an extended geo- dynamic instability, rendering the glacier susceptible to retreat, even with only small changes in climate. Twgl retreating are rapid and catastrophic, generally resulting in the loss of a substantial portion of the glacier over a matter of decades. The best studied example is Columbia Glacier, which entered retreat phase in the early 1980s [Meier and Post, 1987] and has since calved back 20 kilometers, thinned more than 500 meters, and delivered approximately 150 cubic kilometers (25%–40% of original volume) of ice to the Pacific Ocean [Walter et al., 2010]. Glacial-geological observations of nearshore submarine termini show evidence of large-scale retreat of at least 120 kilometers in a period of 100–500 years [Caffin et al., 2001].

During retreat, rapid mass loss is facilitated by strong increases in the tightly coupled rates of ice flow (resupply and calving). Over decades, the more typical terminal retreat is marked by a quasi-steady state transition with mass loss. Some glaciers exhibit a more abrupt transition, evident as alpine glaciers in the absence of marine influence. In this case, mass loss is primarily due to glacier thinning and upstream drawdown, resulting in a more abrupt transition of the flow field. The best example of a glacier in this category is the Columbia Glacier, which has undergone a significant thinning event in response to accelerated retreat.

The Tidewater Glacier Cycle

The Tidewater Glacier Cycle [Meier and Post, 1975] provides a solid foundation upon which modern investigations of the dynamic processes leading to glacier retreat are built. The cycle is characterized by a sequence of events: 1) a period of rapid advance, 2) a period of stable advance, and 3) a period of rapid retreat.

During the period of rapid advance, glacier termini prograde, resulting in increased volume and mass. Meanwhile, the calving glaciers located at the head of adjoining Bockleys Bay either terminate in their retreated positions or are slowly advancing into foredeep fjords. Significant regional-scale asymmetry in glacier behavior complicates the study of dynamic glacier climate relationships. At least 100 years of centennial timescale mass loss can be observed, with a noticeable change in the rate of retreat.

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In the wake of the 11 March 2011 Tohoku earthquake and tsunami, debris washed out of Japan and much of the debris that washed out to sea continued to flow to and concentrate currents across the Pacific Ocean. The leading edge of a dispersed field of debris that has since then circulated on the ocean floor is estimated by a computer model to be about halfway across the Pacific, 12 days after the tsunami. According to Curtis Ebihara, a contributing oceanographer who has been involved with tracking various kinds of ocean debris for decades, the debris field, which encompasses an area about the size of California, could begin to reach the U.S. West Coast by March 2012.

The National Oceanic and Atmospheric Administration’s Office of Satellite and Information Service was able to track the debris field until mid-February, when the debris became too dispersed to be detected in satellite images. Ebihara, formerly an oceanographer with Mohol and Standard Oil, told Zen that he is not aware of any current and resulting tsunami that might be formed from the debris field because it is now widely dispersed and still too far from any landfall. Ebihara said, though, that his confidence level for the debris field’s estimated size and movement is “very high and unbiased.”

That estimate derives from a numerical model known as the Ocean Surface Currents Simulator (OSClim), developed by James Hillstrom, a retired oceanographer formerly with NASA’s National Marine Fisheries Service. The model, based on U.S. Navy meteorological and ocean current data, was originally developed to track salmon migration. However, Ebihara and Hillstrom have successfully used the model, in conjunction with a beachcomber’s network, to track the location of incidents of oil and plastic debris—while also studying ocean currents—including Nike sneakers, ice hockey gloves, and other items that have fallen into the Pacific from container ships. “A salmon is nothing but a Nike shoe [with a swim speed],” Ebihara said, referring to the ability to track objects. He said the Navy produces an atmospheric sea level pressure field of the area surrounding the Subarctic Pacific every 12 hours on a 90-kilometer grid, and OSClim’s currents [those based on inputs of currents and waves that drag flotsam.”

Ebihara, who in 1936 founded a beachcombers’ alert network to help track debris, said, “We know [the debris] is out there, but we can’t see it.” He said that the debris contains immense amounts of debris along Japan’s coastline. “When the tsunami hit, it was up to 153 feet high, and it washed over 1,700 miles inland.” It basically pulverized whole towns,” he said. “You can literally see it when you put your house through a blander,” which would come out.”

He also added that debris could include pieces of houses, cars, electronic equipment, telephones, and other items from daily life, he said. While some flotsam, such as fishing vessels and computer monitors, could float quickly to other debris (including items such as boat- ing hulls) may lag behind waves, following your or two. “It’s going to be kind of an impact in slow motion,” he said. Ebihara’s tracking marine debris dates back to an incident in May 1950.
that the sneaker was of the right hand. He could find to the dice. It was "an unprecedented scientific opportunity" to study ocean currents, he said. "No one had been to that area yet to study that phenomenon." Calling himself "an oceanic geographer," Ebbesmeyer said that a few more dates would be added. The next, and last, would be in 1983. "If you can start looking into something really important," he said. "In addition to the bomb of the day, they actually do collect debris in certain spots," he added, noting that debris tends to collect under high pressure cells, with the winds driving the flotsam towards the middle of the cells. "What I tend to do is try to figurate out what the real story behind that is," he said. "I want to know what the surface of the ocean is really like, what's all about. It's full of floating things, and each floating thing has this incredible story to tell." For more information, see http://www.flotsametrics.com

---Randy Schmuck, Staff Writer

**Meetings**

**Submit a Workshop Proposal**

The Call for Ocean Leadership is currently accepting workshop proposals for the 4th Ocean Science Conference (OSD IV), associated with the Integrated Ocean Drifting Program (IODP). The submission deadline is October 1, 2011.

The primary goal of the workshop program is to identify promising new scientific objectives and research proposals. Proposed workshops can be of any length (1-4 days). More information can be found here.

http://iodp-osd4.org/funding/workshops/

**Eos**

**Volume 92 Number 37 13 September 2011**

**George C. Reid (1929–2011)**

George Colvin Reid, a pioneering solar and space scientist, passed away at his home in Boulder, Colo., on 6 May 2011 after a brief battle with pancreatic cancer. George was 81. His legacy includes an impressive and prolific scientific career that spanned nearly 60 years and included a number of major contributions to understanding the Sun's effects on the Earth and the space environment, with the exception of his lifetime work on climate change. The National Oceanic and Atmospheric Administration (NOAA) has organized a global network, called the Mexican Eddy Covariance Network (MexFlux), to study carbon cycle science and climate change in Mexico.

The MexFlux network is part of the Carbon Cycle Science Program, which is managed by the Atmospheric Radiation Measurement (ARM) Program, a joint project of the National Science Foundation (NSF) and the Department of Energy. MexFlux is a joint effort of the Mexican government and the United States, with funding from the National Aeronautics and Space Administration (NASA) and the National Oceanic and Atmospheric Administration (NOAA).

**Toward a Mexican Eddy Covariance Network for Carbon Cycle Science**

**First Annual MexFlux Principal Investigators Meeting; Hermosillo, Sonora, Mexico; October 9, 2011**

The MexFlux network has been established in Mexico with more than 30 combined years of information study sites span from new sites installed during 2011 to others 5 to 8 years of deployments. Sites are being studied for the first time in Baja California, oak woodland, sub-tropical forests, and a grassland in Sonora, tropical dry forests in Mexico.

The MexFlux network is part of the Mexican Eddy Covariance Network (MexFlux) by identifying researchers, study sites, and scientific goals. During the meeting, researchers will discuss the development of the MexFlux network and the results of measurements that have been made in Mexico with more than 30 combined years of information.

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AGU Leadership Reflects Back, Looks Forward

McEntee: My expectations were that this would be a chaotic and challenging environment, with a large group, the AGU Council. At the first meeting I chaired, the fall Council meeting, there were 80 people in the room. I was excited, I was positive, I was confident, that we were going to be able to get all of the great member energy and focus it toward the strategic issues in the strategic plan. We’ve put together an executive director, we’ve added in the budget line to support the strategic directions of the strategic plan, and we’ve put together working groups of volunteers and staff to be able to carry that out and new ways of working. So I think that’s a tremendously satisfying because it was unclear how this experiment would play out.

Finn: I think the exercise of our new governance structure is an important change. Watching this evolve is tremendously satisfying because it was unclear how this experiment would play out.

McPhaden: I think it’s the integrity that is in the breadth and depth of the science. AGU science touches everything that it habitates this planet. I find that satisfying.

Q: What would you each say are the most important changes that have happened at AGU in the past year?

McEntee: I think we’ve made a great start on trying to align the work of the organization—whether it’s at the board level, the council level, the committee level, the working group level, or the staff level—around the programs and the strategic plan. We’ve put our resources also behind that. We’ve made additions in the budget line to support the strategic directions of the strategic plan, and we’ve put together working groups of volunteers and staff to be able to carry that out and new ways of working. So I think that’s a really significant change for the organization.

Finn: The Council was given a charge of asking how to best configure itself. We didn’t really have a solid structure. So for me the most important thing is how much work we’ve actually gotten done and how much really good thinking. Today, for example, at the Council meeting we had really specific tasks and specific motions, so even in this chaotic space, people have been able to get the work done. I think that’s really important. One more thing I cannot emphasize enough how important it has been to have students and early-career people sitting at the table as the Council as council members.

Q: What do you see as the strengths of AGU as an organization, and how are those strengths evolving?

McEntee: I think it’s the integrity that is in the breadth and depth of the science. AGU science touches everything that it habitates this planet. I find that satisfying. I talk to me and they say, ‘AGU, what’s that?’ and then I say, ‘It’s geophysical science; it’s everything from the deep core of the Earth to universes that we can’t even imagine yet to everything in between.’ That’s the breadth and breadth of AGU science. To me that’s the core strength of the organization.

Finn: I think the strength is not just the scientific integrity and depth of the members but their dedication to their fields and how that translates into dedication to AGU. It’s an outward-looking organization as well as inward looking. That is really important. They’re able to take that scientific rigor and integrity and then turn and say, ‘We’re going to focus this in a way that’s going to be beneficial to humanity.’

McPhaden: Core strengths of scientific integrity and passionate commitment are the striking attributes of our organization. I would say there is a desire and a willingness to expand on these scientific strengths to make the science more relevant to societal needs.

Q: What changes should members watch for in the near future?

McPhaden: I think you’re going to see AGU become a more recognizable entity in the mind of the public and in the policy community.
AGU Council Adopts Position Statement on Scientific Expression

On 17 August the AGU Council voted to adopt an American Meteorological Society (AMS) statement on free and open communication of scientific findings as an official position of the AGU. The statement appears at right.

Recent attacks on scientists who present facts that are controversial or politically changed, such as in cases involving climate science, have sparked action by AGU and other scientific societies, including the American Association for the Advancement of Science. Open communication and collaboration are essential to the scientific process and must not be deterred by politics, media, or fear. In a recent letter to The New York Times, AGU president Michael McPhaden stated that "misguided attempts to suppress scientific research, particularly through political pressure, will not make climate change or the role human activity plays in it magically disappear. It will, however, make the objective knowledge needed to inform good policy decisions disappear."

Having a position statement in place gives AGU the authority to act quickly in such cases rather than go to the Executive Committee for a vote first. This follows in step with the federal government’s efforts, being led by the White House Office of Science and Technology Policy, to establish policies around scientific integrity and openness.

During discussion before the vote, the Council added, "This is a statement that portrays their results and the results or constraints arising from national security. Thus, science is imperative. With the specific limitation of proprietary information or constraints arising from national security, scientists must be permitted under scientific communication of results. In return, it is incumbent upon scientists to communicate their findings in ways that portray their results and the results of other’s objectives, professionally, and without sensationalizing or politicizing the associated impacts. These principles matter most—and should be used at any time for guarding and promoting the freedom of responsible scientific expression.

AGU Supports Free and Open Communication of Scientific Findings

The statement below was written by the American Meteorological Society and adopted by the AGU Council on 17 August 2011. AGU added the portion in italics.

Scientists, policy makers, and supporting institutions should guard and promote untethered communication of scientific data, debates, and findings as a component of scientific expression.

Advances in science and the benefits of science to policy, technological progress, research as a whole, and science and making it more relevant. I’m excited about the new ways of pursuing and promoting our scientific activities. We’re going to see a different kind of meeting, a D.C. policy meeting. We’re going to try some panels that are not just AGU scientists that have other types of scientists and other interest areas. You think about natural resources, for example, farmers needing access to water, we might have a panel with somebody representing the farming community, right along with an AGU scientist, right along with somebody who’s been active in policy, right along with someone in the media. We’re going to try that next year, and it should be really interesting. In addition, Mike appointed a task force on scientific ethics and integrity. I hope that by the end of 2012 we have revised policy around that. I think you’ll probably also see a revision to our diversity and inclusion plan and strategy, and new ways to drive leadership development.

Q: What are you excited about in the coming year?

Finn: For me it’s really this potential of everyone bringing forth the organization in a meaningful way, so that they have a real ownership in it, and that you see a really diverse group of people working on being leaders in science.

McPhaden: Something that excites me is, again, this idea of AGU as an authoritative voice. We’re going to feed through our own outreach efforts in the media and with policy makers but also through forming strategic partnerships with other organizations that have common interest in advancing similar scientific agendas. We’re going to see more continued more position statements that enable us to be more effective, and it’s going to be one that’s more relevant because it will be more timely.

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Q: Any concluding thoughts you’d like to share with AGU members?

Finn: I feel fortunate to be the president-elect now because I have a chance to help shape the organization based on its function. We actually have a chance to be a different kind of AGU. We have a chance to have a more active role, and that form is really different than what we’ve had before and different than a lot of other organizations. It’s not hierarchical. Who makes the decision is not as important as the information on which that decision is based.

McPhaden: I would say to the members, “I hope you see the excitement and you’ll join in that excitement, maybe in ways that you hadn’t thought of before.” We have many opportunities for members to be engaged.

AGU leaders sat down for an interview to reflect on the past year and discuss prospects for the future (Picture are left to right) AGU president Mike McPhaden, president-elect Carol Finn, and executive director Chris McEntee. Photo by Joan Rahman.

Third Science Conference on Global and Regional Climate Change

Santa Fe, New Mexico, October 31 - November 3, 2011

Sponsored by Los Alamos National Laboratory Center for Nonlinear Studies, Energy Security Center, and Institute of Geophysics and Planetary Physics

Co-Sponsored by Brookhaven National Laboratory, Oak Ridge National Laboratory, University of Alaska International Arctic Research Institute, New Mexico Consortium, and American Meteorological Society

ABSTRACT SUBMISSION DEADLINE: Sept 12, 2011; post-deadline submissions (posters only) till Oct 17

Submit abstracts (pdf or word) by email to chris@lanl.gov with a copy to dubey@lanl.gov

This conference will focus on climate change and variability from observational, theoretical, and modeling perspectives. Special emphasis will be on climate forcing and feedbacks on global and regional scale, with a special focus on polar regions. Contributions based on conventional as well as unconventional views on climate change and variability are welcome. Submitted papers will be considered for publication in a special section of the Journal of Geophysical Research.

List of confirmed invited speakers includes many top climate experts.

For further details, to submit an abstract and to register, please, visit our website at http://cnsi.lanl.gov/climate.
Assistant Professor in Aquatic Geochemistry/Biogeochemistry. The Department of Earth and Ocean Sciences invites applications for a tenure-track, assistant professor position in aquatics geochemistry or biogeochemistry. We seek an individual with outstanding research capabilities and broad interests related to the ways in which geochemical processes mediate chemical exchange between the hydrosphere, lithosphere, and biosphere. Areas of interest may include characterization of natural systems over long (e.g., seasonal) and short (environmental) time scales and the influences of climate change on biogeochemical activity on elemental cycling. The successful candidate is expected to teach undergraduate and graduate courses in earth sciences and to design an active externally funded research program. Potential collaborative initiatives include Graduate Research Opportunities Program and the Marine Science Program and Research. Applicants should have a Ph.D. in Environmental Engineering, Geography, and Biology.Appointment will be made at assistant professor level. The successful candidate will likely include introductory earth or environmental courses in the curriculum, and will teach undergraduate and graduate level courses related to the candidate’s specialty. A Ph.D. is required at the time of appointment, and post-doctoral experience is desirable. Applicants should submit a vita, statements of research and teaching interests, and the names, addresses and phone numbers of at least three references in a single file to geoss@oregonstate.edu. For more information please contact: Alicia M. Wilson, Geochemistry Search Committee Chair, Department of Earth and Ocean Sciences, University of South Carolina, Columbia, SC 29208. Applications are encouraged to apply. The University of South Carolina is an equal opportunity employer. Women and minorities are encouraged to apply. Applications and recruitment will continue until the position is filled.

Geology / Sedimentology-Dartmouth College invites applications for a post-doctoral research position in biogeochemistry and environmental change in ancient sedimentary systems. Applications from individuals with research interests in biogeochemical processes that determine the bioavailability and loss kinetics of metal contaminants to aquatic systems; in modeling the results of field and laboratory-based research programs; and in developing approaches to allow prediction of contaminant bioaccumulation and detection of potential release mechanisms. In addition, broad familiarity with methods and procedures for preparation of analytical standards and materials using enriched metal stable isotopes, and specific familiarity with nanomaterials in experiments, is required. The position is expected to last a minimum of two years. The incumbent will design and conduct research to determine the influence of metal nanoparticles on environmental processes, and the application of first-authored publications related to metal bioavailability and toxicity, the influence of metal nanoparticles on those environments, and the application of the appropriate stable isotope tracing approaches using ICP-MS. Interested applicants must apply online at http://www.dartmouth.edu/~ehsads/JobOpportunities/Adverts/PostDocAdverts/Pages/Advert.aspx?AdvertID=10836617. Deadline for applications is September 29, 2011.

Assistant Professor in Aquatic Geochemistry/Biogeochemistry. The Department of Earth and Ocean Sciences invites applications for a tenure-track, assistant professor position in aquatics geochemistry or biogeochemistry. We seek an individual with outstanding research capabilities and broad interests related to the ways in which geochemical processes mediate chemical exchange between the hydrosphere, lithosphere, and biosphere. Areas of interest may include characterization of natural systems over long (e.g., seasonal) and short (environmental) time scales and the influences of climate change on biogeochemical activity on elemental cycling. The successful candidate is expected to teach undergraduate and graduate courses in earth sciences and to design an active externally funded research program. Potential collaborative initiatives include Graduate Research Opportunities Program and the Marine Science Program and Research. Applicants should have a Ph.D. in Environmental Engineering, Geography, and Biology. Appointment will be made at assistant professor level. The successful candidate will likely include introductory earth or environmental courses in the curriculum, and will teach undergraduate and graduate level courses related to the candidate’s specialty. A Ph.D. is required at the time of appointment, and post-doctoral experience is desirable. Applicants should submit a vita, statements of research and teaching interests, and the names, addresses and phone numbers of at least three references in a single file to geoss@oregonstate.edu. For more information please contact: Alicia M. Wilson, Geochemistry Search Committee Chair, Department of Earth and Ocean Sciences, University of South Carolina, Columbia, SC 29208. Applications are encouraged to apply. The University of South Carolina is an equal opportunity employer. Women and minorities are encouraged to apply. Applications and recruitment will continue until the position is filled.

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interactions in processes of mineralization in sedimentary systems, evolution of life in the context of sedimentary environments, recent and ancient geochemical analyses of ancient, evolving sedimentary systems, and ancient climate reconstructions to global scales. Particular attention will be given to processes that link sedimentary processes with neotectonics and tectonics, and with paleoenvironmental interpretations of primary and secondary mineral systems. The successful applicant will interact with colleagues at CMERSC and with the large paleontological and biological sciences communities at Rice University and the Center. The successful applicant is expected to develop and maintain research programs in one or more areas of specialization. Applicants must be able to work collaboratively and should have the ability and the willingness to function as a team leader and to serve as a new employee physical plant and annual budgets. Salary will be commensurate with qualifications and experience. The University is an equal opportunity, affirmative action employer, is committed to diversity in its workforce, and encourages applications from women and minorities.

Postdoctoral Research Associate in Soil Geobiology

The Department of Earth and Environmental Science at Dartmouth College, Hanover, NH, is seeking a postdoctoral research associate to work under the supervision of Dr. Assistant Research Scientist/Staff Scientist.

The Integrated Ocean Drilling Program (IODP) at the University of Texas at Austin, Houston, TX, has an immediate opening for a research associate to work as part of the U.S. sediment team of IODP Expedition 312 (2011-2012). This position is primarily Ph.D. level scientists and engineers divided across 10 centers, one of which is the Coastal and Ocean Remote Sensing Branch. The Branch Head is responsible for the development of the Repository for the Marine Sciences and Engineering Institute (R-MSEI), a new facility at Texas A&M University, College Station, Texas 77845 Equal Opportunity/Affirmative Action Employer.

The Remote Sensing Laboratory in Washington, D.C. Code 7202. In Washington, D.C., is seeking a Postdoc to work on a new project related to coastal and ocean remote sensing. The position focuses on the development of remote sensing instruments and satellite systems for monitoring coastal and oceanic environments. The successful candidate will develop and lead research projects in remote sensing, with a focus on coastal and oceanic applications. The candidate will work closely with colleagues at Texas A&M University through the Center for Sustainable Earth Science initiative (ODASES), is recruiting for this position.

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Classified

candidate will prefer a Ph.D. in oceanography with background and expertise, demonstrated by peer-reviewed publications, representation at international conferences, participation in field work, writing, etc., in littoral environmental research with a focus on coastal/inland wetland processes and programs and in personnel management in addition to academic teaching experience. MOTEC requirements would be an important addition to the position. The position is located in the NPWV, which is equivalent to 04-15. Interested parties should submit their applications to the search committee (Dudleston@pdx.edu) prior to the start date. Applications will be considered until the position is filled.

Multiple Tenure-Track Positions in the Department of Atmospheric and Oceanic Sciences, State University of New York at Albany

Interested people should transmit a resume or curriculum vitae, a CV, and a CV to Dr. Davidson Chen, NRL Remote Sensing Research Laboratory, Stennis Space Center, MS 39529-5000. For additional information, please see the web page at: http://www.stennis.nasa.gov. The closing date will be extended until the positions are filled.

Professorship in Geochemistry

Classified

Research Oceanographer Positions. The National Oceanic and Atmospheric Administration’s (NOAA) Atmospheric Oceanic Sciences (AOS) interests in the Center for Satellite Applications and Research (STAR) and the National Environmental Satellite, Data and Information Service (NESDIS) are located in Camp Springs, MD, and a research associate position is about to become available at STAR. The positions will function in the areas of climate dynamics and ocean-atmosphere interaction.

The successful candidate will have a Ph.D. degree in Oceanography, with emphasis in physical oceanography and atmospheric sciences, and have demonstrated productivity in the area of atmosphere-ocean interactions. The successful candidate is expected to be a creative, productive scientist who is able to work independently and as a member of a multidisciplinary research team.

Applications should be submitted to the attention of Dr. A. Williams, Director, National Environmental Satellite, Data, and Information Service (NESDIS), Code 3910-HIT, 4000 Broadway Avenue, Suitland, MD 20746-4000, or e-mail to: awilliams@nws.noaa.gov. The closing date is August 1, 2012. Inquiries can be made by phone: +33492003023, fax: +33492003118, email: awilliams@noaa.gov.