Welcome!

The Polar Research Board (PRB) is pleased to provide you with a preview copy of our first periodic e-newsletter. The purpose of the newsletter is to help keep the polar community abreast of work at the PRB and elsewhere within the National Academies. We expect to send updates three times a year or less, and as it evolves, we may add other features. Please let us know if you have ideas to help us improve it. If you would prefer not to receive future updates, please use the unsubscribe link below or contact Lauren Brown at 202-334-1753 or labrown@nas.edu.

Message from the Chair

Ever wonder where the modern five-day weather forecast comes from? The answer lies in weather history, a fascinating topic. For example, long before we had the technology to warn people of coming storms, we understood that storms generally came from the west (in the northern hemisphere, at least) and could plot the tracks of storms, at least in hindsight. The invention of the telegraph changed that, and for the first time we could communicate faster than storms could travel, and weather warnings could be issued. In the early 1900s the basic equations that govern airflow were first applied to weather, with less than stellar results. We understood the basic physics, but could not solve the equations fast enough to make predictions. Lewis Richardson estimated in 1922 that it would take 64,000 people, all solving parts of the equations, to make numerical predictions in real enough time to predict the weather. I suppose many people at the time threw up their hands and said it's just too complicated. But others kept working away: the computer solved the people problem, the observations and models got better, and today we benefit greatly, personally and economically, from their efforts, with quite accurate forecasts several days in advance.

Today in the polar regions we are observing climate and environmental change proceed fast enough that we can observe it. Sea ice is shrinking in thickness and extent, seasons are changing, ice is melting and moving, ecosystems are changing, and insects and diseases bother us where they never did before. Today we are
faced with the grand challenge of understanding how these changes progress, the physics that govern them, and ultimately how we are to predict them. As in Richardson's time, the task at times seems overwhelming, and we hear the voices of those who say it's too complicated. But we must keep working. We must keep observing and we must keep modeling. No problem is too big to solve; we just need the commitment to solve it.

The Polar Research Board is proud to play a role in this effort. Our core mission is to advance understanding of the polar regions, including all areas of science, engineering, human dimensions, and policy and foster application of polar science to benefit the public and decision makers. As part of the National Academy of Sciences, we serve as purveyors of independent, unbiased advice and observations; we stand ready to do what we can to keep our knowledge advancing, and chip away at those seemingly insurmountable problems. Today the Board is working on two new studies, The US Antarctic Program: Future Science Opportunities in the Antarctic and Southern Ocean, and The Legacies and Lessons of International Polar Year 2007-2008. The former will help shape our research efforts in Antarctica for the coming two decades. The latter will assess and synthesize the extensive efforts of the International Polar Year to better understand how polar regions function. We're particularly pleased to being conducting this final IPY activity, given the heroic efforts of past PRB chair, Robin Bell, her Board members, and PRB staff in helping the IPY to happen and be such a success. The PRB is also proud to announce our new ongoing Frontiers Workshop series, in which we will investigate the boundaries and barriers of the many areas that make up polar science. Our first Frontiers Workshop focused on ecosystems (details below). Future workshops will address other areas of immediate need and interest.

As always, the PRB welcomes your insight and comments. We represent you, the research community, and are constantly seeking ways to do that job better. We very much appreciate your contributions and suggestions for new studies, and are particularly interested to hear from those members of the community that are willing to be nominated to serve on the PRB, as well as the various study committees. I encourage all such input be brought to the attention of Chris Elfring, celfring@nas.edu, Director, Polar Research Board.

Finally, I want to acknowledge the hard work and dedication of the PRB staff and volunteer members. The PRB members selflessly donate their time, effort and intelligence, and the PRB staff tirelessly makes the impossible happen on a regular basis. It's a pleasure to work with such talented people, and we in the polar community should be proud of them and their accomplishments.

James W. C. White
Chair, Polar Research Board

2010 AGU Meeting Events

The Future of Polar Science: The Path Beyond the IPY
Date: Monday, December 13
Time: 8:00 AM - 10:00 AM
Invited Speakers:
Robin Bell, Columbia University
Ross Powell, Northern Illinois University
Hajo Eicken, University of Alaska Fairbanks
Karl Erb, National Science Foundation

Poster Session: Tuesday, December 14; 1:40 PM - 6:00 PM;
Moscone South

Conveners:
James White, University of Colorado, Boulder
Julie Brigham-Grette, University of Massachusetts Amherst
James Swift, UCSD Scripps Institution of Oceanography

The polar regions are at the forefront of modern environmental change, currently experiencing the largest and fastest changes in climate and environment. This session, convened by the PRB, which served as the U.S. National Committee for IPY, will explore the future of Arctic and Antarctic science beyond IPY 2007-08. Presentations will look at where we are now and what next in understanding physical and biological systems, the role of the poles in the evolution of global systems, social changes in northern regions, education and outreach, and the interface between science and policy.

**Cryosphere Reception and Martha T. Muse Prize Presentation**

**Date:** Tuesday, December 14  
**Time:** 6:30 PM - 8:30 PM  
**Location:** San Francisco Marriott Marquis, Salon 7

Associate Prof. Helen Fricker from Scripps Institution of Oceanography of the University of California-San Diego has been awarded the prestigious 2010 Martha T. Muse Prize for Science and Policy in Antarctica. Professor Fricker will be awarded the Prize and deliver the Muse Lecture during the Cryosphere Reception.

The Martha T. Muse Prize ([www.museprize.org](http://www.museprize.org)) is awarded to individuals who have demonstrated excellence in Antarctic science or policy and who show clear potential for sustained and significant contributions that enhance our understanding of Antarctic science or policy and promote Antarctica’s preservation for future generations. The Prize is supported by the Tinker Foundation and administered by the Scientific Committee on Antarctic Research (SCAR). The support of the US Polar Research Board and the National Academy of Sciences were instrumental in establishing the Prize. The Prize is inspired by Martha T. Muse’s passion for Antarctica and is a legacy of the International Polar Year 2007-2008.

**Nye Lecture**

**Date:** Tuesday, December 14  
**Time:** 5:00 PM - 6:00 PM  
**Location:** Moscone South, Gateway Ballroom, Room 104

*Mountain Hydrology, The Fourth Paradigm, and the Color of Snow*
Presented by J. Dozier, Bren School of Environmental Science & Management, University of California, Santa Barbara
New Study - The US Antarctic Program: Future Science Opportunities in the Antarctic and Southern Ocean

At the request of the National Science Foundation (NSF) and the Office of Science and Technology Policy (OSTP), the NRC will convene a Committee on Future Science Opportunities in the Antarctic and Southern Ocean. The committee will identify and summarize the changes to important science conducted on Antarctica and the surrounding Southern Ocean that will demand attention over the next two decades; assess the anticipated types and scope of future U.S. scientific endeavors and international scientific collaborations over a ~20-year period in Antarctica and the Southern Ocean; and identify and summarize likely future science requirements of the U.S. research community, including the needs of the federal mission agencies that depend on US Antarctic Program infrastructure and logistics (e.g., NASA, NOAA, USGS, DOE, EPA, and the Smithsonian Institution). Further, the committee will:

- build upon the work of other organizations (e.g., ICSU, SCAR, etc.), draw upon recent scientific achievements in Antarctica and the Southern Ocean including those completed during the 2007-2009 IPY, and utilize previous workshops and reports (e.g., those from the NSF and NRC that pertain to future research directions in Antarctica);
- identify changes to anticipated types and scope of scientific programs for the U.S. in Antarctica and the Southern Ocean over the next two decades;
- examine appropriate opportunities for international Antarctic scientific collaborations;
- report any new emerging technologies should they be found while reviewing the scientific achievements that enhance the U.S. ability to meet these priorities or the application of new technologies that enable the collection of scientific data in more effective or efficient ways; and
- identify logistical capabilities and technologies that, from a science perspective, could be improved or undergo major changes, with the intent of informing the concurrent FACA Blue Ribbon Panel that will examine logistical operations in Antarctica.

New Study - The Legacies and Lessons of International Polar Year 2007-2008

International Polar Year (IPY) 2007-2008 was an intense, international campaign of polar observations, research, and analysis designed to further understanding of the polar regions. With the completion of the main, fieldwork phase of IPY, the polar research community would like to examine the key lessons that were learned, and the legacies that will result, from this effort. To this end, an ad hoc committee will organize a community-wide workshop and produce a report that:

- highlights the outcomes (new scientific discoveries, observations, and findings, including infrastructure and education and outreach contributions) of the multi-faceted IPY campaign from a U.S. perspective,
integrates the lessons from different activities, including lessons learned about the benefits gained and challenges posed by international and multidisciplinary collaborations and by data access and management issues, and
records U.S. IPY efforts so they are available to a broad audience including researchers, decision makers, and stakeholders.

The workshop will be hosted June 15-16, 2011. Stay tuned for location and preliminary agenda.

Study in Progress • Frontiers in Understanding Climate Change and Polar Ecosystems: A Workshop

An ad hoc committee planned and conducted a workshop on August 24-25, 2010 in Cambridge, MD to explore what is known about the impacts of climate change on polar ecosystems and identify what gaps or unknowns exist that will be "frontiers" for future science. The workshop included (i) select case study presentations that highlight known and anticipated impacts of a changing climate in polar regions, and (ii) interactive discussion about our evolving capabilities to study ecological systems and the big "next" questions that need to be addressed. The workshop looked at examples and research from both terrestrial and marine ecosystems, illustrating changes taking place in these ecosystems, and exploring how such changes can or cannot be linked to climate parameters. The workshop brought together polar and non-polar scientists to explore whether there are new capabilities available to study ecosystems in different ways and to identify the research and technology advances that are needed to better understand the changes occurring in polar ecosystems.

The workshop report is expected to be released in early 2011.

New NRC Reports

Informing an Effective Response to Climate Change

The newest panel report from the America's Climate Choices suite of studies demonstrates that demand for information to support climate-related decisions has grown as people, organizations, and governments have moved ahead with plans and actions to reduce greenhouse gas emissions and to adapt to the impacts of climate change. Today, however, the nation lacks comprehensive, robust, and credible information systems to inform climate choices and evaluate their effectiveness. This report examines information needs and calls for the federal government to build upon its existing efforts and those of state and local government, the private sector and citizens by establishing clear federal leadership, responsibility, and coordination for climate related decisions, climate risk management, information systems, and services.
Advancing the Science of Climate Change
Climate change is occurring, is caused largely by human activities, and poses significant risks for and in many cases is already affecting a broad range of human and natural systems. The compelling case for these conclusions is provided in this report. While noting that there is always more to learn and that the scientific process is never closed, the book shows that hypotheses about climate change are supported by multiple lines of evidence and have stood firm in the face of serious debate and careful evaluation of alternative explanations. Advancing the Science of Climate Change calls for a single federal entity or program to coordinate a national, multidisciplinary research effort aimed at improving both understanding and responses to climate change. Seven cross-cutting research themes are identified to support this scientific enterprise. In addition, leaders of federal climate research should redouble efforts to deploy a comprehensive climate observing system, improve climate models and other analytical tools, invest in human capital, and improve linkages between research and decisions by forming partnerships with action-oriented programs.

Limiting the Magnitude of Future Climate Change
Climate change, driven by the increasing concentration of greenhouse gases in the atmosphere, poses serious, wide-ranging threats to human societies and natural ecosystems around the world. The largest overall source of greenhouse gas emissions is the burning of fossil fuels. The global atmospheric concentration of carbon dioxide, the dominant greenhouse gas of concern, is increasing by roughly two parts per million per year, and the United States is currently the second-largest contributor to global emissions behind China. Limiting the Magnitude of Future Climate Change focuses on the role of the United States in the global effort to reduce greenhouse gas emissions. The book concludes that in order to ensure that all levels of government, the private sector, and millions of households and individuals are contributing to shared national goals, the United States should establish a "budget" that sets a limit on total domestic greenhouse emissions from 2010-2050. Meeting such a budget would require a major departure from business as usual in the way the nation produces and uses energy—and that the nation act now to aggressively deploy all available energy efficiencies and less carbon-intensive technologies and to develop new ones.

Adapting to the Impacts of Climate Change
Across the United States, impacts of climate change are already evident. Some extreme weather events such as heat waves have become more frequent and intense, cold extremes have become less frequent, and patterns of rainfall are likely changing. The proportion of precipitation that falls as rain rather than snow has increased across the western United States and Arctic sea ice has been reduced significantly. Sea level has been rising faster than at any time in recent history, threatening the natural and built environments on the coasts. Even if emissions of greenhouse gases were substantially reduced now, climate change
and its resulting impacts would continue for some time to come. To date, decisions related to the management and protection of the nation's people, resources, and infrastructure have been based on records in the recent past, when climate was relatively stable. *Adapting to the Impacts of Climate Change* calls for a new paradigm—one that considers a range of possible future climate conditions and impacts that may be well outside the realm of past experience.

[Click here for more information on the America's Climate Choices suite of activities.](#)

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**Ocean Acidification: A National Strategy to Meet the Challenges of a Changing Ocean**

Excess carbon dioxide in the atmosphere—in addition to contributing to climate change—is absorbed by the ocean, making sea water more acidic and leading to a suite of changes in ocean chemistry. Preliminary evidence suggests ocean acidification will have negative effects on corals, shellfish, and other marine life, with wide-ranging consequences for ecosystems, fisheries, and tourism. This report, requested by Congress, reviews the current state of knowledge and identifies gaps in understanding, and provides scientific advice to help guide the national ocean acidification research program.

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**Climate Stabilization Targets: Emissions, Concentrations, and Impacts Over Decades to Millennia**

This new report from the National Research Council concludes that emissions of carbon dioxide from the burning of fossil fuels have ushered in a new epoch where human activities will largely determine the evolution of Earth's climate. Because carbon dioxide in the atmosphere is long lived, it can effectively lock the Earth and future generations into a range of impacts, some of which could become very severe. Therefore, emissions reductions choices made today matter in determining impacts experienced not just over the next few decades, but in the coming centuries and millennia. Policy choices can be informed by recent advances in climate science that quantify the relationships between increases in carbon dioxide and global warming, related climate changes, and resulting impacts, such as changes in streamflow, wildfires, crop productivity, extreme hot summers, and sea level rise. The report quantifies several future impacts per degree (°C) of global warming. The report also demonstrates that emissions reductions larger than about 80%, relative to whatever peak global emissions rate may be reached, are required to approximately stabilize carbon dioxide concentrations for a century or so at any chosen target level.

**Monitoring Climate Change Impacts: Metrics at the Intersection of the Human and Earth Systems**

This report from the National Research Council identifies seventy-one metrics that when taken together may give advance warning of climate-related changes and their impacts across a range of both local and global scales. Currently, many observing systems capture
elements of how climate is changing, such as direct measurements of atmospheric and ocean temperature. However, these measurements do not provide information about the impacts of climate change on humans that are especially relevant for political and economic planning and decision making. The report lays out an illustrative suite of indicators, metrics, and measurements — and the locations around the globe where the measurements can be applied -- that are important for understanding global climate change and providing insight into environmental sustainability. For instance, several of the metrics are sea level rise, seasonal snow cover, and air quality.

IASC Working Groups Established and Members Appointed

The PRB is pleased to announce 10 new members of the U.S. delegation to the International Arctic Science Committee (IASC) Working Groups.

IASC is an inter-disciplinary committee of the International Council for Science (ICSU). The mission is to encourage, facilitate, and promote basic and applied interdisciplinary research in or concerned with the Arctic at a circumpolar or international level and to provide scientific advice on arctic issues. The working groups will identify and formulate science plans, act as scientific advisory boards to the IASC Council, and assist IASC in the implementation of its science mission.

U.S. Delegate to IASC
Dr. Jacqueline Grebmeier, University of Maryland

U.S. Representatives to the Working Groups

TERRESTRIAL
Dr. Donald (Skip) Walker, University of Alaska Fairbanks
Dr. Vanessa Lougheed, University of Texas at El Paso

CRYOSPHERE
Dr. Walter Meier, National Snow and Ice Data Center
Dr. Elizabeth Hunke, Los Alamos National Laboratory

MARINE
Dr. Rolf Gradinger, University of Alaska Fairbanks
Dr. Mary-Louise Timmermans, Yale University

ATMOSPHERE
Dr. James Overland, National Oceanic and Atmospheric Administration
Dr. John Cassano, University of Colorado Boulder

SOCIAL AND HUMAN
Dr. Sven Haakanson, Alutiiq Museum
Dr. Peter Schweitzer, University of Alaska Fairbanks
SCAR Standing Scientific Group Members Appointed

The PRB is pleased to announce that 7 new members (**) joined the U.S. delegation to the Scientific Committee on Antarctic Research (SCAR) during the summer of 2010. Thank you to the following former members for their service to SCAR: Dr. H. Lester Reed, Dr. Michael Goebel, Dr. Beata Csatho, Dr. John Ruhl, and Dr. Paul Mayewski.

SCAR is charged with initiating, developing and coordinating high quality international scientific research in the Antarctic region, and on the role of the Antarctic region in the Earth system. The scientific business of SCAR is conducted by its Standing Scientific Groups (SSG) which represent the scientific disciplines active in Antarctic research. The SCAR representatives participate in the biannual SCAR meetings to help coordinate disciplinary scientific research across the Members and establish research groups to address specific scientific issues.

U.S. Delegates to SCAR
Dr. Mahlon C. Kennicutt, Texas A&M University, SCAR President
Dr. Terry Wilson, Ohio State University

U.S. Representatives to the Standing Scientific Groups

LIFE SCIENCES
Dr. Deneb Karentz, University of San Francisco
Dr. Alison Murray, Desert Research Institute
** Dr. Diana Wall, Colorado State University
** Dr. Marc Shepanek, NASA

GEOSCIENCES
Dr. W. Berry Lyons, Ohio State University
** Dr. Philip J. Bart, Louisiana State University
** Dr. Brenda Hall, University of Maine
** Dr. Douglas A. Wiens, Washington University in St. Louis

PHYSICAL SCIENCES
Dr. Christina L. Hulbe, Portland State University
Dr. Allan T. Weatherwax, Siena College
** Dr. Terry Deschler, University of Wyoming
** Dr. Joseph McConnell, Desert Research Institute

IASC Arctic Science Summit Week

Please note the following dates for the 2011 ASSW Meeting to be held in Seoul, Korea:

- Sunday 27 March: PAG & AOSB Workshop
- Monday 28 March: APECS Workshop and IASC Business Meetings
- Tuesday 29 March - Thursday 31 March: Science Symposium
- Friday 1 April: IASC Business Meetings
XXXII SCAR and Open Science Conference

Please note the following dates for the 2012 XXXII SCAR Conference to be held in Portland, Oregon:

- Friday 13 - Sunday 15 July: SCAR Business meetings
- Monday 16 - Thursday 19 July: Open Science Conference
- Friday 20 July: SCAR SSG meetings
- Monday 23 - Wednesday 25 July: SCAR Delegates Meeting

About the PRB

The Polar Research Board (PRB) is a unit of the National Academies dedicated to enhancing understanding of the Arctic, Antarctic, and high-latitude regions and providing guidance to Congress, federal agencies, and the nation on cold region issues. The PRB facilitates participation of U.S. scientists in two international, nongovernmental polar scientific organizations—the Scientific Committee on Antarctic Research (SCAR) and the International Arctic Science Committee (IASC). The Board accomplishes its mission by:

- providing a forum for the polar science community to address research needs and policy issues;
- conducting studies and workshops on emerging scientific and policy issues in response to requests from federal agencies and others;
- providing program reviews, guidance, and assessments of priorities, and;
- facilitating communication on polar issues among academia, industry, and government.

You are receiving this update based on your participation in ongoing or past activities of the Board. If you would prefer not to receive future updates or would like to be added to the recipient list, please contact Lauren Brown at 202-334-1753 or labrown@nas.edu.

The nation turns to the National Academies-National Academy of Sciences, National Academy of Engineering, Institute of Medicine, and National Research Council for independent, objective advice on issues that affect people's lives worldwide.

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