

TESTIMONY OF
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BEFORE THE
COMMITTEE ON COMMERCE, SCIENCE AND TRANSPORTATION
AND THE
COMMITTEE ON FOREIGN RELATIONS
U.S. SENATE
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Thank you Chairman Stevens, Chairman Lugar, Senator Murkowski and members of both Senate Committees for the opportunity to be here today. In my capacity as Vice Chancellor for the University of Alaska in Fairbanks, I am responsible for developing and implementing the University's strategy for participating in activities of the upcoming 4th International Polar Year. As a researcher and educator, and now the chief research officer of America's only arctic university, I would like to share my perspectives on why IPY is important to Alaska and our nation, how we have prepared ourselves to play key roles in these activities, and leave you with recommendations for valuable legacies that could result from IPY.

The upcoming IPY is staged to celebrate the 50th anniversary of the International Geophysical Year, IGY, held in 1957-58. IGY was modeled on the two previous Polar Years, 1882-83 and 1932-33, where coordinated scientific studies were conducted to understand our planet's natural processes and cycles. IGY was originally planned to take place at the centennial celebration of the first Polar Year in 1982-1983 but instead was held 25 years earlier to take advantage of an unusually intense period of sunspot activity. Thus IGY came at a most critical time for our nation and the world. During World War Two and the early post-war era, technologies had been developed with the potential for unimaginable devastation. Ideological differences between the two multinational superpowers heightened concerns that those technologies might some day be used as tools of aggression. IGY was an effort to develop peaceful uses of these post-war technologies in order to improve knowledge about our planet – particularly its polar regions – through an international campaign of coordinated scientific observations. IGY was a tremendous success; over 30,000 scientists from 67 countries took part in what was the largest and most ambitious scientific program ever attempted. Some of the scientific legacies left by this effort include:

- The discovery of the Van Allen radiation belts that ring the earth and affect communication and spacecraft operations;
- The charting of ocean depths and ocean currents;
- A mapping of the magnetic characteristics of the ocean floor that soon led to the revolutionary theory of plate tectonics;
- The first rigorous study of the Antarctic continent and its ice sheets;
- The Antarctic Treaty, making the whole continent a place of scientific research, free of national claims and international rivalry.

But there were other important benefits that our nation derived from the investment we made in this program. IGY expanded national research investments significantly and permanently, leading to tremendous payoffs in intellectual property and societal benefits throughout the latter half of the 20th Century. Furthermore, IGY was a much needed opportunity for the United States to exhibit, on the global stage, its technological capabilities and the political will to work equitably and openly with the international scientific community. We invested heavily and, as a result, the world has looked to the US for scientific leadership ever since.

Now, on the eve of the 4th IPY, we face a different type of scientific challenge: the challenge to understand how our circumpolar regions are changing and to develop reliable strategies for mitigating the negative impacts and optimizing the opportunities that accompany this change. You have undoubtedly heard testimony from others on the various lines of evidence demonstrating that the Arctic is experiencing dramatic climate-induced changes: retreating sea ice, melting permafrost, and the migration of the Arctic tree line to higher elevations and latitudes, to name a few. And this is not just a regional issue affecting a relatively few arctic inhabitants. The Polar Regions play key roles in the global climate system; therefore a more complete understanding of the Arctic and Antarctic is imperative if we are to improve global climate models.

In addition, many of the benefits our nation derived from IGY, fifty years ago, apply today. The upcoming IPY is a much needed opportunity to reaffirm to the world our place as leaders in science and technology, to demonstrate that we are committed to open, international research programs that advance scientific knowledge, and to invest wisely in activities that will inspire and train the next generation of US scientists and engineers.

Often, when the term “polar” is used, people gravitate toward visions of Antarctica or the North Pole, or exotic uninhabited places. Obviously, one does not need to look that far. Polar, in United States terms, means Alaska and its people.

Alaskans are in the midst of change; we are in immediate need of IPY to more fully understand what is happening and why, to be able to reliably forecast events to come, identify how to hold on to our unique and valuable resources such as indigenous languages and culture and learn to make informed decisions so that we can address the multitude of challenges before us.

As Alaska’s Research University, the Fairbanks campus as well as the University of Alaska’s other campuses have been involved in IPY planning and implementation for the past 3 years. We are well prepared to play key roles in the upcoming activities. Over 75 percent of our research pertains to Alaska and the broader Arctic region. This commitment is reflected in the fact that over 25 percent of all the research and educational proposals endorsed by the IPY International Programme Office involve Fairbanks campus researchers. A list of the endorsed research projects is appended to this testimony.

Our field research stations, such as the Toolik Field Station on the North Slope, have been systematically gathering ecological and biological data for nearly half a century. Those sites will undoubtedly be important centers of IPY research. Through our network of colleges across rural Alaska and ongoing research programs such as the Center for Alaska Native Health Research we have gained valuable experience working with and for our Alaska Native populations. This experience is essential in ensuring that the upcoming IPY addresses their issues, involves them as research partners and astute observers – not just subjects – and returns to them the results and rewards of these research activities.

Considerable financial resources will be needed if the United States is to take a leading role in IPY. Other nations have committed far more than ours, at least thus far. But we at the University of Alaska are not waiting for outside funds before we move forward. The University's President Mark Hamilton has committed \$3.5 million to support 13 IPY Postdoctoral Fellowships for 3 years. These young researchers were chosen from 180 applicants from around the world to work on IPY-related research projects at the 3 main campuses across the UA system: 9 at Fairbanks, 3 at Anchorage, and 1 in Juneau. We look to these young scientists – five of whom came from other countries – to broaden our research capabilities and expand our connections around the world as we engage in the internationally coordinated research activities of IPY.

Eighteen months ago we launched an IPY strategy that included research coordination, educational outreach, community engagement, and public relations. We have taken steps to ensure that the research and educational opportunities afforded by IPY extend across all sectors of Alaska society. Through awards from the Department of State, Bureau of Educational and Cultural Affairs, and the NOAA Cooperative Institute for Arctic Research, we have the resources to initiate this plan which includes the following activities:

- The *IPY Education and Outreach Office* in conjunction with the University of the Arctic. UArctic is a cooperative network of educational institutions committed to higher education and research in the North. Its members share resources, facilities, and expertise to build post-secondary education programs that are relevant and accessible to northern students.
- Graduate and undergraduate research grants for student involvement in IPY research projects across the University system.
- A K12 engagement plan built around two 'contests' targeted toward K12 students: the first is an IPY art contest where students from across Alaska submit works of art that capture the spirit of IPY. The best from each age group will be brought to Fairbanks for an awards ceremony and their art will be exhibited at our *Museum of the North* during IPY. The second is a writing contest for high school students to submit their research papers on the benefits of past IPY activities to Alaska and the Arctic. Again, each age group will be judged and the winners will give presentations at one of the public functions during IPY.

- Implementation of the *Think Tank of the North*. This is a series of events that seeks to address critical issues facing the Arctic such as climate change impacts, development and mineral extraction issues, sustainable natural resource management, natural hazard mitigation, cultural impacts, and information technology infrastructure needs. The University will sponsor leading researchers, educators, and policy makers from around the world for week-long visits to brainstorm with our faculty and engage the public in open discussions.
- Planning for the *Ninth International Conference on Permafrost* to be held late June – early July, 2008 in Fairbanks. Attendance at this event is expected to exceed 900 people.
- The *Helge Instad Memorial Symposium on Arctic Change* held September 8-10, 2006. More than 170 scientists from Alaska, Norway, Russia, Canada and the Lower 48 gathered at Fairbanks to commemorate the Norwegian explorer, scientist and author, who spent time with the Nunamiut (Eskimo) people of Anaktuvuk Pass, Alaska and discuss common research areas across the Arctic Countries. The symposium was co-sponsored by the Fairbanks campus and the Royal Norwegian Embassy and included a celebration officially naming Ingstad Mountain in Anaktuvuk Pass on September 10, 2006.
- A series of public presentations extending through the end of IPY, beginning with Jared Diamond (*Collapse: How Societies Choose to Fail or Succeed*) last March, Peter Smith (*The Martian Arctic*) June 27, and Dava Sobel (*Latitude*) March 19, 2007). Others will be selected during the next few months.
- Support for the *Arctic Institute of North America* to advance the study of the North American and circumpolar Arctic through the natural and social sciences, the arts and humanities and to acquire, preserve and disseminate information on the physical, environmental and social conditions in the North.

In conclusion, I would like to leave you with a few recommendations for legacy investments that would yield lasting returns to the nation and our nation's only arctic state:

- Approve the National Science Foundation's budget to support IPY research and educational outreach. NSF is the ideal support organization to lead our nation's IPY activities with its demonstrated commitment to polar research and the development of a US research community that is globally engaged. This is an investment that will pay huge scientific dividends, will strengthen our academic institutions, and gain the world's appreciation.
- Support the *Arctic Observing Network* (AON). The tight linkages between the physical, biological and social systems in the Arctic, and the intensity of current and projected changes, call for a coordinated monitoring program that extends across the arctic and provides long-term, multidisciplinary observations. "Without such a program, it is very difficult to describe current conditions in the Arctic, let alone understand the changes that are underway or their connections to the rest of

the Earth system”¹. AON would include satellites, terrestrial observatories, ocean buoys and moorings, weather stations, hydrologic monitoring stations, ecological sampling networks, arctic residents, and other data sources, many of which already exist or are being planned. IPY offers an immediate opportunity for major progress.

- Expand network connectivity infrastructure within Alaska and from Alaska to the US mainland to acceptable national standards. Currently, our main academic network connection to the outside world is OC-3. The current standard for large Internet Service Providers in the rest of the nation is OC-192, which is 64 times faster than our connection. But this is just part of the problem. Our state is in desperate need of better high-speed connections between rural communities to ensure values that most US citizens have grown accustomed to: educational opportunities, employment opportunities, and access to other information that could enrich their lives.
- Update high-resolution digital imagery and elevation data coverage for Alaska. These fundamental data sets are critically important in emergency response, wildfire behavior modeling, aviation safety, change detection, and making informed resource management decisions. Yet, the most recent program to acquire imagery and elevation data for Alaska was over 50 years ago. Alaska has changed and technologies have improved to the point that Alaska’s maps are significantly below national standards. This year, Alaska’s Governor Frank Murkowski and the State Legislature approved \$2 million to initiate a Statewide Digital Mapping Initiative to “put some skin in the game”. Some federal assistance would assist us in bringing our maps up to national standards.

Thank you again for the opportunity to present this testimony today, and thank you for your interest in the International Polar Year. Please feel free to contact me if you have any additional questions.

¹ *Toward an Integrated Arctic Observing Network*, Committee on Designing an Arctic Observing Network, National Research Council, ISBN: 0-309-10052-6, 128 pages, 8 1/2 x 11, paperback, 2006.

Appendix: Endorsed IPY Projects with University of Alaska Participants	
UA Faculty Member	Title
Igor Polyakov, UAF	Integrated Arctic Ocean Observing System
Hajo Eicken, Rolf Gradinger, Igor Dmitrenko, UAF	The Pan Arctic cluster for Climate forcing of the Arctic Marine Ecosystem
Sarah Fowell, UAF	The Bering Strait, Rapid Change, and Land Bridge Paleoeecology
Katrin Iken, UAF	Impact of CLimate induced glacial melting on marine and terrestrial COastal communities on a gradient along the Western Antarctic PENinsula (ClicOPEN)
JingFeng Wu, UAF	International Polar Year GEOTRACES: An international study of the biogeochemical cycles of Trace Elements and Isotopes in the Arctic and Southern Oceans
Matt Nolan, UAF	The dynamic response of Arctic glaciers to global warming
Virgil L. (Buck) Sharpton, UAF	International Polar Year (IPY) Data and Information Service (DIS) for Distributed Data Management
Vladimir Romanovsky, Larry Hinzman, Gary Kofinas, Matt Nolan, Tom Osterkamp, Chien Lu Ping, Buck Sharpton, Kenji Yoshikawa, Doug Kane, Donald (Skip) Walker, UAF	Permafrost Observatory Project: A Contribution to the Thermal State of Permafrost
Peter Schweitzer, Anne Sudkamp, UAF	International Congress of Arctic Social Sciences VI in Nuuk, 2007-2008
Bernard Coakley, Sarah Fowell, Leonard Johnson, UAF	Plate Tectonics and Polar Gateways in Earth History
Scott Bailey, UAF	Synchronized observations of Polar Mesospheric Clouds (PMC), Aurora, and other large-scale polar phenomena from the International Space Station (ISS) and ground sites
David Atkinson, UAF	Arctic Circum-Polar Coastal Observatory Network
Hajo Eicken, Jennifer Hutchings, Rudiger Gens, Rolf Gradinger, Mark Johnson, Virgil (Buck) Sharpton, UAF	The state of the Arctic sea ice cover: Physical and biological properties and processes in a changing environment
Douglas Kane, UAF	The Arctic Hydrological Cycle Monitoring, Modelling and Assessment Program
Jeffrey Welker, UA Craig Lingle, UAF	The State and Fate of the Cryosphere
Martin Truffer, UAF	IPY in the Antarctic Peninsula – Ice and Climate
Ray Barnhardt, Oscar Kawagley, UAF	Circumpolar Center for Learning and Indigenous Knowledge Systems
Vladimir Romanovsky, UAF	Deep Permafrost Scientific Drilling
Gerd Wendler, Martha Shulski, UAF	Climate change in the Arctic with special emphasis on Alaska
Russ R Hopcroft, UAF	Ecosystem West Greenland
Lawrence D Kaplan, James Ruppert, Patrick Marlow, UAF	Glocalization – Language, Literature and Media among Inuit and Sami people
Matt Nolan, UAF	Bipolar Climate Machinery - A study of the interplay of northern and southern polar processes in driving and amplifying global climate as recorded in paleoclimate archives and their significance for the generation of realistic estimates of future climate and sea level development
Todd O'Hara, UAF	Polar bear (Ursus maritimus) circumpolar health assessment in relation to toxicants and climate change
Larry Hinzman, Vladimir Romanovsky, Igor Semiletov, Donald (Skip) Walker, UAF	Cold Land Processes in the Northern Hemisphere continents and their Coastal Zone: Regional and Global Climate and Societal-Ecosystem Linkages and Interactions

Donald (Skip) Walker, Andrew Balsar, Uma Bhatt, Keith Boggs, Brian Barnes, Rick Caulfield, Terry Chapin, Craig Dorman, Hajo Eicken, Brad Griffith, Tom Heinrichs, Larry Hinzman, John Kelly, Gary Kofinas, Hilmar Maier, Gary Michaelson, Corinne Munger, Matt Nolan, Chien-LU Ping, Anupma Prakesh, Peter Prokein, Martha Reynolds, Vladimir Romanovsky, Mike Sfraga, Buck Sharpton, John Walsh, UAF	Greening of the Arctic: Circumpolar Biomass
Frank Willams, UAF	High Performance Computing and Mass Storage Resources for IPY Research Support
Gary Kofinas, Perry Barboza, Brad Griffith, Kris Hundertmark, Robert White, Greg Finstad, UAF	Starting the clock for the CARMA Network: Impacts on Human-Rangifer Systems in the Circumarctic
David Norton, Martin Robards, UAF	Sea Ice Knowledge and Use: Assessing Arctic Environmental and Social Change
Karen Perdue, UAF Kathy Murray, Carl Hild, UAA	Arctic Human Health Initiative
Catherine F. Cahill, UAF	POLAR-AOD: a network to characterize the means, variability, and trends of the climate-forcing properties of aerosols in polar regions
Roger Hansen, Jeff Freymueller, UAF	Polar Earth Observing Network
Sydonia Bret-Harte, UAF	International Tundra Experiment (ITEX): impacts of long-term experimental warming and climate variability on tundra ecosystems
Martin Jeffries, UAF	The University of the Arctic: Providing Higher Education and Outreach Programs for the International Polar Year
Richard Collins, UAF	International Arctic Systems for Observing the Atmosphere
Larry Hinzman, UAF	The hydrological cycle of the Canadian Polar Regions: processes, parameterization, prediction and change
David Atkinson, UAF	Impacts of Surface Fluxes on Arctic Climate: Severe Storms, Effects on Coastal Processes and Relationships to Changing Climate
Richard Boone, UAF	Biodiversity of soil meso- and macro- fauna and latitudinal gradient impact assessment along the proposed Alaska gas pipeline
Richard Collins, UAF	The Structure and Evolution of the Polar Stratosphere and Mesosphere and Links to the Troposphere during IPY
Shusun Li, Martin Jeffries, Kim Morris, UAF	Assessment of surface albedo feedback and the variability of surface radiation budget in the Arctic climate system using satellite and ground observations
Jack Kruse, UAA	The Political Economy of Northern Development
Dave McGuire, UAF	Arctic Biosphere-Atmosphere Coupling across multiple Scales
Martin Jeffries, UAF	Bering Sea Sub-Network of Community-Based Environmental Monitoring, Observation and Information Stations
Chien-Lu Ping, UAF	Response of Arctic and Subarctic soils in a changing Earth: dynamic and frontier studies
Martin Truffer, UAF	Remote sensing monitoring and forecast of surging glaciers' evolution with the investigation of modern fluctuations of surging glaciers of the Alaska, Svalbard and high elevated Asia glaciers
Stuart Chapin, UAF	Polar Disturbance and Ecosystem Services: Links between Climate and Human Well-being
Martin Jeffries, UAF	Consortium for coordination of Observation and Monitoring of the Arctic for Assessment and Research
Maribeth Murray, UAF	The Impacts of Oil and Gas Activity on Peoples in the Arctic Using a Multiple Securities Perspective
Martin Jeffries, UAF	Integrated Communication, Education and Evaluation
Rolf Gradinger, Russ Hopcroft, Bodil Bluhm, Falk Huettmann, Rob Cermak, John Kelley, Stephen Jewett,	Arctic Ocean Diversity (ArcOD)

UAF Oliver Hedgepeth, UA	
Martin Truffer, Roman Motyka, UAF	Measurement and Attribution of recent Greenland Ice sheet chaNgeS (MARGINS)
Scott Goldsmith, UAA	The Economy of the North
Chien-Lu Ping, Vladimir Romanovsky, UAF	Carbon Pools in Permafrost Regions
Jack Kruse, UAA	Survey of Living Conditions in the Arctic, SLiCA - Remote Access Analysis System
Elena B. Sparrow, Donald A. (Skip) Walker, UAF	Biodiversity and Climate Induced Lifecycle Changes of Arctic Spiders
Gary Kofinas, Patty Gray, UAF	ANTLER Network Secretariat and Workshop Series
Peter Schweitzer, UAF	Moved by the State: Perspectives on Relocation and Resettlement in the Circumpolar North
Todd Sherman, Jean Flanagan Carlo, UAF	International Polar Year Arctic Nations Exhibition and Activities including Symposia, Seminars, Workshops, Residencies, Documentation and Event Coordination
Todd O'Hara, Alan Springer, UAF	MERSAM (MERcurySeabirdArticMonitoring)