variation of vegetation fraction also strongly affected the snowmelt because it modified surface albedo and changed the radiative forcings on the snow surface. However, the exaggerated snowmelt was produced by the land-surface model in the version of MM5 used in this study because of the lower simulated surface albedo and the neglect of the effects of vegetation fraction on snowmelt. Thus, a realistic physically based land-surface scheme in a meso-scale model is crucial to predictions of snowmelt, which is essential to the climate variability and water resources in the Sierra Nevada region.

URL: http://esd.lbl.gov/RCC

C41C MCC: Level 2 Thursday 0830h

International Polar Year 2007-2008 III Posters *(joint with A, B, G, H, OS, PP, S, ED, GC)*

Presiding: **C Elfring,** Polar Research Board, The National Academies**; S Drobot,** Polar Research Board, The National Academies

C41C-0976 0830h POSTER

Measurement of Key Polar Climate Variables in IPY4 Through Deployment of an International Fleet of Robotic Vehicles

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At the present time sea ice thickness distribution is understood to be a crucial variable that is descriptive of polar climate in a complex, integrative sense such that its determination over time is a significant priority. As it happens, the sea ice distribution is also a challenging determination given ideal circumstances of platforms and instrumentation, and these circumstances are not reliably extant. The standard approaches to sea ice information, ice-capable ships and satellites, do not at this time provide a workable strategy; ships cannot supply the coverage and satellites have not been equipped with proper instrumentation, which is in fact just now entering development phase. A strategy with promise for obtaining sea ice thickness in addition to other significant surface variables is the deployment of instrumented robotic vehicles; a particularly useful vehicle design is the Inflatable Rover under consideration for use on Mars. These vehicles can travel a 1-3 kilometers per hour powered by solar energy and can thus accomplish a major traverse in a 100-day deployment. The program we put forward calls for an international fleet of suitably designed rovers, each measuring useful variables relating to ice, snow, atmosphere, radiation, etc. In addition the rovers could collaborate in such tasks as monitoring each others activities, aiding in calibration and maintenance, and the like. Each rover could involve 2-3 co-investigators from different institutions and countries. Rover data would be satellite linked allowing K-12 monitoring of progress of the fleet. This IPY4 project integrates new technology into polar science, would engage the public and schoolchildren, could serve as a means of international cooperation, and all the while collects valuable climate change data. This work performed under contract to NASA.

C41C-0977 0830h POSTER

Polar Ocean-Atmosphere-Sea Ice-Snowpack Interactions, and Global Change

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Studies of atmospheric and snow composition over the past few decades have revealed that there is very active exchange of gases and particles between the atmosphere and the surface in polar regions. Furthermore, it is now known that solar radiation can greatly modify the nature of these exchange processes, both in terms of the rates, and in terms of the nature of chemical species that are exchanged. For example, it is known that NOx, carbonyl compounds, and molecular halogens can be chemically/photochemically produced in snowpacks and sea ice, followed by their emission into the atmosphere where they can influence the abundance of radiatively active gases like O3, particles, and persistent organic pollutants. Given that the coverage of snow and sea ice is changing, a more quantitative understanding of these processes is necessary, to enable more reliable prediction of the future state of the atmosphere. Here we will discuss new internationally coordinated research activities (including the Ocean-Atmosphere-Sea Ice-Snowpack (OASIS) program) aimed at improving our understanding of chemical species exchange between the polar surfaces, oceans, and the atmosphere, and how they relate to the International Polar Year.

C41C-0978 0830h POSTER

The IGAC Air-Ice Chemical Interactions (AICI) Task and the IPY

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The new structure of IGBP focuses on study of the three main compartments (land, ocean, and atmosphere) and the exchanges and interactions between them. The cryosphere - ice, snow and permafrost - occurs in all three of these compartments. It forms a large proportion of the surface separating the land and ocean from the atmosphere: a seasonal maximum of 40% of land is covered by snow or ice, while several percent of the ocean is sea-ice covered. Recent observations in the Arctic and in Antarctica indicate that the snowpack is photochemically active, producing and emitting to the atmosphere a variety of photochemically active compounds such as HCHO and other carbonyl compounds, NOx, HONO, molecular halogens, and alkyl halides, which can significantly impact the composition of the overlying atmosphere. It is known that ozone can be photochemically destroyed within the snowpack, and in the overlying atmosphere as a result of photochemistry involving halogen species generated within and emitted from the snowpack. Because global change will result in changes to snow cover, and because these processes are currently ill-defined and thus difficult to predict with accuracy, an international coordinated effort regarding the role of ice and snow in atmospheric composition is needed. We have created the Air-Ice Chemical Interactions (AICI) project, as a new task within the IGBP IGAC Project. In this paper, we will discuss AICI, its structure, function, and future plans, in relation to the following scientific questions:

- How will changing amounts of sea ice, snow cover, and atmospheric ice alter atmospheric chemistry and composition and are there important feedbacks to climate?
- What are the present regional emissions and losses over snow, ice and sea ice, and how could they alter with changing climate?

Until now, our knowledge of polar tropospheric chemistry has been limited to a few, mainly coastal sites. The IPY offers an opportunity for a coordinated effort to determine the spatial and seasonal structure of the phenomena that have been observed. This could be done through concerted observations at manned stations, from airborne platforms, and using a network of autonomous sensors deployed throughout the Arctic and Antarctic.

C41C-0979 0830h POSTER

The Arctic Grand Challenge: Abrupt Climate Change

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Trouble in polar paradise (Science, 08/30/02), significant changes in the Arctic environment are scientifically documented (R.E. Moritz et al. ibid.). More trouble, lots more, “abrupt climate change,” (R. B. Alley, et al. Science 03/28/03). R. Corell, Arctic Climate Impact Assessment team (ACIA), “If you want to see what will happen in the rest of the world 25 years from now just look what's happening in the Arctic,” (Arctic Council meeting, Iceland, 08/03). What to do? Make abrupt Arctic climate change a grand challenge for the IPY-4 and beyond! Scientifically:Describe the “state” of the Arctic climate system as succinctly as possible and accept it as the point of departure.Develop a hypothesis and criteria what constitutes “abrupt climate change,” in the Arctic that can be tested with observations. Observations: Bring to bear existing observations and coordinate new investments in observations through an IPY-4 scientific management committee. Make the new Barrow, Alaska, Global Climate Change Research Facility a major U.S. contribution and focal point for the IPY-4 in the U.S Arctic. Arctic populations, Native peoples: The people of the North are living already, daily, with wrenching change, encroaching on their habitats and cultures. For them “the earth is faster now,” (I. Krupnik and D. Jolly, ARCUS, 2002). From a political, economic, social and entirely realistic perspective, an Arctic grand challenge without the total integration of the Native peoples in this effort cannot succeed. Therefore: Communications must be established, and the respective Native entities must be approached with the determination to create well founded, well functioning, enduring partnerships. In the U.S. Arctic, Barrow with its long history of involvement and active support of science and with the new global climate change research facility should be the focal point of choice Private industry: Resource extraction in the Arctic followed by oil and gas consumption, return the combustion products as greenhouse gases to their regions of origin. Thus multinational company operations are affected by their own activities. There is a strong, convincing case, that these industrial giants must be involved in Arctic partnerships of the grand challenge. A most instructive, very successful example is the collaboration by the chemical companies after the discovery of the polar ozone holes, followed by the replacement of the culprit chlorofluorocarbon compounds. Public relations and involvement/education: The IPY offers a unique opportunity to showcase and drive home, into homes, the seriousness of the issue, Hollywood/Madison Avenue/ NASA style, nothing else will do. Ultimately we need to be mindful that “civilizations are ephemeral compared to species. -What we need is a primer on science, clearly written and unambiguous in its meaning-a primer for anyone interested in the state of the Earth and how to survive and live well on it.” (James Lovelock, Science, 08/05/98). - Let's start in the Arctic-NOW.

C41C-0980 0830h POSTER

Observing the Arctic From Space: Educational Opportunities for an International Polar Year

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Recommendations for an International Polar Year (IPY) will require integrated circumpolar research projects using present and advanced technologies. The IPY will offer exceptional opportunities for participation by indigenous residents of the Arctic. Educational outreach will be an essential component of IPY programs, to improve science competence and citizen awareness through participation in IPY projects and utilization of educational products. An important and practical objective of IPY educational outreach is to recognize that the earth is a system and that it is best from space that we can acquire seasonal and secular atmospheric, terrestrial and oceanic environmental data. Acquisition of reliable ground truth data in support of remote sensing of geophysical and geochemical variables will be essential, especially with broad long-term coverage in the polar regions. It should be an essential element of the IPY program. In the United States NASA has developed a strategy for long-term monitoring of some key parameters needed to bring us closer to the answers we need regarding climate change in the Arctic and polar regions. Technology consists of a group of five polar satellites that make a suite of earth observations referred to as the "A-Train". Data from this group of satellites, as well as from the Orbital Carbon Observatory (OCO) and older Quikscat and new Seawinds radar missions, will provide focus for an education program based not only on the acquisition of polar data but also on how these data correlate with global observations. We recommend that an educational outreach secretariat be developed for each national program that will involve the indigenous people

of the Arctic and elsewhere in acquisition of data relevant to satellite observations. The secretariat will provide for information transfer, coordination with scientific projects, opportunities for participation in project activities, communication of scientific results to the public, and greater participation of residents of circumpolar nations in polar science.

C41C-0981 0830h POSTER

Antarctic Sea Ice in the IPY

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Antarctic Sea Ice covers an area of 20 million km2 at maximum extent and therefore represents an areal coverage larger than either the Arctic ice cover or the Antarctic continent. Studies of Antarctic sea ice in the modern era were only initiated well after the IGY, with the advent of passive microwave satellite coverage in 1973, followed by the use of several countries icebreaking research vessels over the last two decades. Useful knowledge of basic ice thickness, properties and processes is being addressed by an ice observations programs and several process studies, but the scale of activity is well below that conducted for the Arctic ice cover. The absence of submarine activity in the Antarctic which has provided large scale information on the changing Arctic ice thickness distribution is particularly notable as a critical measurement in understanding climate impact. As well, only two short term drift stations (Ice Station Weddell in 1992 and Ice Station Polarstern in 2004) have or will provide limited time series information on sea ice and ocean processes compared to multiple drift stations and yearlong experiments in the Arctic, dating back to IGY. The two technologies of Autonomous Underwater Vehicles specifically designed for long-range ice operations (500km) (e.g. Autosub Under Ice) and the recently developed international icebreaking research vessel capability for the Antarctic therefore gives an opportunity for two International Polar Year programs to provide critical information for the Antartic sea ice cover commensurate with our knowledge of the Arctic. The proposed programs are: 1. A circumpolar survey of the Antarctic sea ice thickness distribution at near maximum extent using two ship-based autonomous underwater vehicles and several countries' icebreakers. 2. An International Ice Drifting Station in the Bellingshausen-Amundsen-Ross Sea using icebreakers and drifting buoys to characterize the sea ice, ocean and climate in this unknown region of Antarctic multiyear ice. These measurements will provide directly comparable measurements to those of the Arctic Ocean' ice cover as well as a year-long snapshot of ice, ocean and climate conditions useful for numerical model verification for climate change prediction. New venues for training and experience of oceanographers, climate and sea ice scientists, and numerical modelers will also be provided to examine the many future opportunites in the Antarctic.

C41C-0982 0830h POSTER

A New Quiet GSN Site at the South Pole: Comparison of Seismic Data Between SPA and QSPA.

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Due to increasing noise from Amundsen-Scott South Pole Station (ASSPS), a new Global Seismic Network (GSN) station, QSPA, was constructed in the 2002-2003 field season to supplant the previous GSN station, SPA, in operation since c. 1985. QSPA is the first experiment established at the South Pole Remote Earth Science and Seismological Observatory (SPRESSO). The new instruments reside in the newly-designated seismic Quiet Sector, 8 km southeast of ASSPS. SPRESSO provides a much lower noise environment, yet is close enough to the south pole to be effectively co-sited with Earth's rotational axis for long-period seismological purposes. The SPRESSO site was selected after examining tractor surface noise propagation, balanced against power and communication considerations. Numerical modeling showed that ASSPS noise should be fairly well trapped in near-surface, lower-velocity firn zone and indicated that a burial depth of 300 m would very substantially reduce noise. QSPA consists of a Geotech Instruments KS-54000 at 275 m and Guralp CMG-3Tb at 255 m depth, separated horizontally by 10 m. These depths are approximately 160 m below the local firn/ice transition. QSPA also includes a near-surface vault (~5 m depth) housing Streckeisen STS-1V and STS-2 sensors. SPA has been left in operation for a period of ~1 yr to allow for a thorough comparison with QSPA. Although 8 km from the South Pole station activities, the QSPA site borehole instruments still sense South Pole noise. However, these noise levels are significantly diminished at frequencies >1 Hz and at periods >20 s. From 1 to 15 Hz, the improved noise environment is especially dramatic. For example, background noise at 2 Hz is 15 db below SPA, ~20-25 dB at 3 Hz, ~30-35 dB at 4Hz, and ~35-40 dB above 5Hz. Between 2 and 10 Hz the QSPA Guralp borehole sensor shows data intervals with noise levels below the Peterson (1993) Low Noise Model (PLNM) (with minimum noise at ~3Hz ~12dB below PLNM), making the site among the quietest ever measured. The improvement in the long period (T > 20 s) band is ~5-10 dB. Most significant noise reduction is seen in the vertical channels, although the horizontal data are improved as well.

C41C-0983 0830h POSTER

From the Sun to the Ice - Then Where? A Bi-polar, Integrated View of the Role of Polar Snow and Floating Ice Covers in the Earth's Heat Budget During IPY 2007/08

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The polar regions play a key role in the disposition of energy and in particular solar radiation in the earth's climate system. With the largest seasonal variations in surface albedo occurring over the polar oceans and with substantial changes in the extent and nature of the snow and ice covers in recent decades, the polar regions are a critical link between top-of-the atmosphere radiative fluxes and solar energy absorbed by the earth system. While recent studies have greatly improved our knowledge of the heat budget of the polar oceans, we are still far from understanding a number of fundamental questions related to the role of snow and ice in the global radiation budget and their importance for albedo feedback processes. For example, currently albedo parameterizations in large-scale sea ice and climate models are only partially successful in taking into account the physical processes driving seasonal and interannual albedo changes. In fact, the majority of models employ different albedo parameterizations for northern and southern hemisphere snow and sea ice. This is dictated by the strong contrasts in snow and ice melt processes in Arctic and Antarctic, which in of themselves are not all that well understood. Our own research in the Western Arctic and in the southern Ross Sea indicates that snow may play a crucial, currently underestimated role in governing these processes and hence the nature and magnitude of ice-albedo feedback processes. Here, we propose that an integrated, bi-polar examination of the interaction between snow and floating ice covers (sea and lake ice), coupled with a global-scale analysis of the role of polar ice masses in affecting the earth's radiation budget would provide an interesting and scientifically significant cryospheric thread within the framework of the IPY 2007/08. This work would also address other important aspects such as large-scale cloud radiative forcing over ice surfaces and spatio-temporal partitioning of the radiation reaching the surface. At the same time, such a program would provide direct linkages to the aims of the International Heliospheric Year. The observational effort would comprise a pan-polar approach to ground-based measurements along with satellite remote sensing, augmented by numerical simulations. Based on studies of the energy and mass balance of Arctic and Antarctic snow and ice covers, we will show how such a cryospheric component could be integrated into the overall aims of the IPY. IPY will provide an extraordinary opportunity to capture the imagination of the general public and school children. Our proposed effort will take advantage of this opportunity to convey information about the solar radiation and about the role the polar regions play in global climate. There will be an extensive educational outreach component that will include media contacts, web sites, classroom programs, and public lectures. Examples of such approaches, e.g., the Alaska Lake Ice and Snow Observatory Network (ALISON, www.gi.alaska.edu/alison) or Barrow Coastal Ice Observations (www.arcticice.org) will be discussed.

C41C-0984 0830h POSTER

IUGG's Contribution to IPY and IGY+50

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The International Union of Geodesy and Geophysics was instrumental in the planning and implementing the Internatinal Geophysical Year 1957-58 and is now keen to participate in IGY's fiftieth anniversary 2007-08. There are three kinds of activities being planned by IUGG and its seven associations: 1. There will be a symposium at IUGG General Assembly in 2007 that will summarize the tremendous step forward that IGY meant to the geophysical disciplines, in particular in the polar regions, and will highlight the progress made since. 2. IAGA, IUGG's Association for Geomagnetism and Aeronomy, will be supported by all other associations in preparing an Electronic Geophysical Year, eGY, that is to promote geoscientific data availability and access worldwide through a coordinated international initiative, making use of modern digital communication technologies. Note that a paper on eGY is presented in Union Symposium 06. 3. At the Union level and through its associations and their commissions IUGG will become involved in the International Polar Year and in the International Year of the planet Earth of IUGS. In addition to its traditional emphasis on geosciences IUGG involvement will be open to human aspects of polar regions as well. This paper will present examples of possible contributions of IUGG to IPY.

C41C-0985 0830h POSTER

Role of the Polar Research Board in Facilitating Planning for IPY 2007-2008

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IPY 2007-2008 has the potential to be a valuable burst of scientific activity that adds to our understanding of polar regions and their role in the global system, and it stands to engage a new generation of scientists and the public in an exciting way. IPY 2007-2008 will be truly international and broadly multidisciplinary. But how is something of this scale planned and implemented? Where are the opportunities for input from the science community? How do we reconcile the differences in the American system of supporting science with approaches used in other nations, when attempting to work jointly? How can the large, diverse polar science community be satisfied that IPY reflects their priorities, given the necessity of making choices about how to focus IPY activities? The National Academy of Sciences played a key role in organizing the International Geophysical Year in 1957-1958. In this mode, the Polar Research Board, a unit of the National Academies (which includes the National Academy of Sciences, National Academy of Engineering, and Institute of Medicine), is attempting to play a role in facilitating IPY 2007-2007 planning. The Polar Research Board is a nongovernmental body composed of volunteers from the polar science community. Its mission is to promote excellence in polar science and provide advice to agencies and the nation on issues of importance in the Arctic, Antarctic, and cold regions in general. The PRB represents US interests in two international nongovernmental polar science organizations - the Scientific Committee on Antarctic Research (SCAR) and the International Arctic Science Committee (IASC). The PRB's status as an independent body gives it a special role in organizing IPY 2007-2008 at

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both the national and international levels. At the national level, it has attempted to provide opportunities for dialog on what US scientists would like IPY to be, and to have a relatively open process so that bottom-up ideas can be considered. At the international level, it is showing leadership in a more complex setting. The PRB continues to act as a conduit of information so that all interested in making IPY 2007-2008 a success can participate.

URL: http://www.nationalacademies.org/prb/ipy

C41C-0986 0830h POSTER

Involving Early Career Researchers in the Next IPY

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Nearly 50 years ago, the International Geophysical Year (IGY) heralded in a new era of scientific discovery, and many of the early-career researchers involved in the IGY became scientific leaders in the ensuing decades. The next International Polar Year (IPY) in 2007 could be one of the largest scientific endeavors ever conceived for the polar regions, and to have a lasting effect, today's early-career researchers need to be involved in the planning and the science of the next IPY. Given the multidisciplinary nature of many pressing polar science issues, mechanisms must be created to bring together diverse early-career researchers to discuss IPY planning efforts, potential collaborations, and help train the future Polar science leaders. This poster discusses various programs aimed at bringing together early-career researchers to assist in planning the next IPY, and suggests how the creation of a new IPY-specific conference for early-career researchers could create a lasting impression for the IPY.

C41C-0987 0830h POSTER

The International Arctic Buoy Programme (IABP)

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The Arctic has undergone dramatic changes in weather, climate and environment. It should be noted that many of these changes were first observed and studied using data from the International Arctic Buoy Programme (IABP). For example, IABP data were fundamental to Walsh et al. (1996) showing that atmospheric pressure has decreased, Rigor et al. (2000) showing that air temperatures have increased, and to Proshutinsky and Johnson (1997); Steele and Boyd, (1998); Kwok, (2000); and Rigor et al. (2002) showing that the clockwise circulation of sea ice and the ocean has weakened. All these results relied heavily on data from the IABP. In addition to supporting these studies of climate change, the IABP observations are also used to forecast weather and ice conditions, validate satellite retrievals of environmental variables, to force, validate and initialize numerical models. Over 350 papers have been written using data from the IABP. The observations and datasets of the IABP data are one of the cornerstones for environmental forecasting and research in the Arctic.

URL: http://IABP.apl.washington.edu

C41C-0988 0830h POSTER

Polar Experiment Network for Geospace Upper-atmosphere Investigations (PENGUIn): A Vision for Global Polar Studies and Education

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The several decades since the advent of space flight have witnessed the ever growing importance and relevance of the Earth's space environment for understanding the functioning of Earth within the solar system and for understanding the effects of the Sun's influence on technological systems deployed on Earth and in space. Achieving a comprehensive understanding of Earth's geospace environment requires knowledge of the ionosphere and magnetosphere in both polar regions. Outlined in this talk is a broad, multi-national plan to investigate in depth, from Antarctica and nominally conjugate regions in the Arctic, the electrodynamic system that comprises the space environment of Planet Earth. Specifics include (a) the phased development of a new and comprehensive upper atmosphere geophysical measurement program based upon distributed instruments operating in an extreme polar environments; (b) real time data collection via satellites; (c) a methodology to build synergistic data sets from a global distribution of southern and northern hemisphere instrument arrays; and (d) an integration with all levels of education including high school, undergraduate, graduate, and post-doctoral.

C41C-0989 0830h POSTER

Polar Science and Fast Ice Sheet Drilling - the FASTDRILL Perspective

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Antarctica and Greenland represent natural laboratories, which yield discoveries that advance different scientific disciplines and capture the imagination of the general public. The scientific community interested in sampling polar ice sheets and their substrata has been growing recently and now incorporates biologists, geologists, geophysicists, glaciologists, and paleoclimatologists. Significant advances in these scientific disciplines will require targeted sampling strategies and the acquisition of data from arrays of deep access boreholes on spatial scales ranging from local to continent-wide. The International Polar Year will provide an excellent platform for launching the latest US initiative aimed at providing polar scientists with new means necessary for rapid and mobile access to englacial and subglacial environments. This initiative was discussed at the FASTDRILL workshop held at UCSC in October 2002. The overarching goal of the workshop was to begin the process of matching specific drilling and sampling technologies to broad objectives of interdisciplinary polar sciences. All scientific disciplines represented at the workshop identified several top-level questions that can be addressed with aid of the FASTDRILL platform. Biologists are interested in investigating life in icy environments as a potential analog for extraterrestrial life, and to better understand the origin and evolution of life on our planet. Interactions between tectonic processes and ice-sheet evolution are of primary importance to geologists and geophysicists. The glaciological community is very interested in the stability of modern ice sheets and in extending the ice core record of paleoclimate back in time. The FASTDRILL workshop provided an opportunity to recognize the high degree of commonality in scientific objectives and drilling targets across the different polar sciences. The desired FASTDRILL platform must meet high expectations in terms of mobility, rapid recovery of short ice, rock, and sediment cores, and ability to acquire subglacial water samples. Technological challenges associated with development of such a platform are matched by the high level of scientific interest in acquiring the capability for fast and mobile ice sheet drilling and sampling. The scientific payout of such investment will last for decades beyond the International Polar Year and will do much to advance the polar sciences and Earth sciences in general.

C41C-0990 0830h POSTER

Assessing, understanding, and conveying the state of the Arctic sea ice cover

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Recent studies indicate that the Arctic sea ice cover is undergoing significant climate-induced changes, affecting both its extent and thickness. Satellite-derived estimates of Arctic sea ice extent suggest a reduction of about 3% per decade since 1978. Ice thickness data from submarines suggest a net thinning of the sea ice cover since 1958. Changes (including oscillatory changes) in atmospheric circulation and the thermohaline properties of the upper ocean have also been observed. These changes impact not only the Arctic, but the global climate system and are likely accelerated by such processes as the ice-albedo feedback. It is important to continue and expand long-term observations of these changes to (a) improve the fundamental understanding of the role of the sea ice cover in the global climate system and (b) use the changes in the sea ice cover as an early indicator of climate change. This is a formidable task that spans a range of temporal and spatial scales. Fortunately, there are numerous tools that can be brought to bear on this task, including satellite remote sensing, autonomous buoys, ocean moorings, field campaigns and numerical models. We suggest the integrated and coordinated use of these tools during the International Polar Year to monitor the state of the Arctic sea ice cover and investigate its governing processes. For example, satellite remote sensing provides the large-scale snapshots of such basic parameters as ice distribution, melt zone, and cloud fraction at intervals of half a day to a week. Buoys and moorings can contribute high temporal resolution and can measure parameters currently unavailable from space including ice thickness, internal ice temperature, and ocean temperature and salinity. Field campaigns can be used to explore, in detail, the processes that govern the ice cover. Numerical models can be used to assess the character of the changes in the ice cover and predict their impacts on the rest of the climate system. This work affords extraordinary opportunities for outreach activities, because of the public interest in both the Arctic and climate change. Data can be streamed to public web sites in near real time, as can photographs and commentaries from field camps. The breadth of activities affords considerable opportunities to engage the next generation of researchers in such diverse fields as computer science, engineering, and geophysics.

C41C-0991 0830h POSTER

IPY: An excellent opportunity to improve Arctic DEMs and document today's Arctic for future generations

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Digital Elevation Models (DEMs) are an essential resource for any field or modeling study in the terrestrial Arctic, yet the DEMs available there are currently the worst on the planet. Efforts in the past decade have led to the acquisition of new DEMs for the entire Antarctic continent (Radarsat Antarctic Mapping Project, RAMP) and for nearly all of the planet within +/- 60 degrees latitude (Space Shuttle Radar Topography Mission, SRTM). Thus, the U.S. Arctic is left with 1:63,360 maps made during the IGY times, which does not meet the USGS' own standards for accuracy. Other countries are left in similar circumstances, with DEMs created from paper maps with usually no better than 1:50,000 scale, and there is as yet no central circum-polar clearinghouse for such DEMs. And because nearly all of these DEMs were created by digitizing paper base maps, most contain artifacts of the digitizing process that further reduce their quality. It could be argued that DEMs of the polar regions of the planet Mars are more accurate, consistent, and easily available than those from the Earth's Arctic. Only an organized international effort could possibly manage such a data collection task, and the project seems well suited to the goals of the International Polar Year. Perhaps being last in line for new DEMs is actually beneficial in this case, as technological improvements have led to new acquisition systems that are more accurate than those used in SRTM and RAMP. For example, airborne synthetic aperture radar (SAR) interferometry has demonstrated the capability to acquire DEMs with 5 meter postings, 1 cm vertical resolution, and 2 m vertical accuracies, in addition to an orthorectified radar backscatter image at 2.5 meter postings; compare this with the 60m x 90m posting available currently and no associated orthoimagery. That is, for the price of an Arctic DEM, we would also get a picture of the Arctic at 2.5 meter resolution, and this picture can be merged with color Landsat to create stunning orthorectified images. These SAR systems, flying on a LearJet, can rapidly acquire day or night in a wide range of weather, eliminating most of the logistical delays common to other systems. Airborne Lidar, a laser based system, is also advanced to the stage where nearshore coastal bathymetry can be measured, such that we could seamlessly integrate DEMs and bathymetry. While the price of such acquisitions is high, it is comparable to DEM acquisitions on the rest of the planet and Mars, and the benefits would be enormous to a wide variety of polar researchers - perfect for the IPY. Presented in this poster will be several examples of how new DEMs have improved our Arctic research at UAF. McCall Glacier was originally an IGY field site and now has the longest record of mass balance observations of any glacier in the US Arctic, but our measurement program is hampered by the lack of decent topographic maps there. Our research using a new DEM in the Kuparuk River watershed in Alaska has shown that these DEMs substantially improve our hydrological modeling in such low gradient watersheds. With DEMs of such high accuracy and resolution, we can also begin a program of repeat-topographic mapping, to document changes not only to glaciers, but subtler permafrost phenomena with decimeter-scale changes such as pingos, thermokarsts, polygons, and oriented lakes. The time to acquire such data is now, however, before widespread changes occur. Thus the upcoming IPY can perhaps leave no better legacy than to replace the IGY-era, mediocre topographic maps with an accurate, high-resolution digital elevation model representing today's Arctic, which will remain valuable to generations of polar scientists.

C41C-0992 0830h POSTER

The Role of Laboratory-Based Studies of the Physical and Biological Properties of Sea Ice in Supporting the Observation and Modeling of Ice Covered Seas

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Laboratory-based studies of the physical and biological properties of sea ice are an essential link between high latitude field observations and existing numerical models. Such studies promote improved understanding of climatic variability and its impact on sea ice and the structure of ice-dependent marine ecosystems. Controlled laboratory experiments can help identify feedback mechanisms between physical and biological processes and their response to climate fluctuations. Climatically sensitive processes occurring between sea ice and the atmosphere and sea ice and the ocean determine surface radiative energy fluxes and the transfer of nutrients and mass across these boundaries. High temporally and spatially resolved analyses of sea ice under controlled environmental conditions lend insight to the physics that drive these transfer processes. Techniques such as optical probing, thin section photography, and microscopy can be used to conduct experiments on natural sea ice core samples and laboratory-grown ice. Such experiments yield insight on small scale processes from the microscopic to the meter scale and can be powerful interdisciplinary tools for education and model parameterization development. Examples of laboratory investigations by the authors include observation of the response of sea ice microstructure to changes in temperature, assessment of the relationships between ice structure and the partitioning of solar radiation by first-year sea ice covers, observation of pore evolution and interfacial structure, and quantification of the production and impact of microbial metabolic products on the mechanical, optical, and textural characteristics of sea ice.

C41C-0993 0830h POSTER

Live from the Arctic

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For reasons of geography and geophysics, the poles of our planet, the Arctic and Antarctica, are places where climate change appears first: they are global canaries in the mine shaft. But while Antarctica (its penguins and ozone hole, for example) has been relatively well-documented in recent books, TV programs and journalism, the far North has received somewhat less attention. This project builds on and advances what has been done to date to share the people, places, and stories of the North with all Americans through multiple media, over several years.
In a collaborative project between the Arctic Research Consortium of the United States (ARCUS) and PASSPORT TO KNOWLEDGE, Live from the Arctic will bring the Arctic environment to the public through a series of primetime broadcasts, live and taped programming, interactive virtual field trips, and webcasts. The five-year project will culminate during the 2007-2008 International Polar Year (IPY). Live from the Arctic will:
A. Promote global understanding about the value and world -wide significance of the Arctic,
B. Bring cutting-edge research to both non-formal and formal education communities,
C. Provide opportunities for collaboration between arctic scientists, arctic communities, and the general public.
Content will focus on the following four themes.
1. Pan-Arctic Changes and Impacts on Land (i.e. snow cover; permafrost; glaciers; hydrology; species composition, distribution, and abundance; subsistence harvesting)
2. Pan-Arctic Changes and Impacts in the Sea (i.e. salinity, temperature, currents, nutrients, sea ice, marine ecosystems (including people, marine mammals and fisheries)
3. Pan-Arctic Changes and Impacts in the Atmosphere (i.e. precipitation and evaporation; effects on humans and their communities)
4. Global Perspectives (i.e. effects on humans and communities, impacts to rest of the world)
In The Earth is Faster Now, a recent collection of comments by members of indigenous arctic peoples, arctic residents speak in eloquent terms of the changes they see around them, manifested in new patterns of vegetation, the melting of permafrost and the absence of game species that used to be abundant. Meanwhile, new satellites and more sophisticated sensors on the ground and in the ice, add scientific testimony that seems to support and even extend native perceptions. Live from the Arctic will unify both perspectives, and use todays most powerful and effective communications media to connect young people and general audiences all across America to researchers and communities living and working in the Arctic. During IPY there will be a level of interest in the Polar regions unprecedented in a generation. Live from the Arctic offers unique resources to satisfy that curiosity, and encourage active participation and engagement in understanding some of Earths most significant peoples, places and rapidly changing conditions.

C41C-0994 0830h POSTER

The Autonomous Real-time Remote Observatory (ARRO)

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The Autonomous Real-time Remote Observatory (ARRO) is a new observing platform being developed for use on the Antarctic polar plateau. It will accommodate an integrated suite of instruments, with the goal of enabling reliable multi–instrument observations from multiple sites. The observatory will include a power system and heated space sufficient for a dozen or more experiments, as well as data acquisition, data storage, and real–time transmission of at least some data via satellite. The observatory will also be capable of receiving and reacting to pre-defined commands transmitted by satellite. Although the observatory will be designed specifically for year–round operation in the challenging environment of the Antarctic plateau, it will also be capable of operating in polar climates in general, including Arctic regions. Two prototype units are currently being built. One of these will be installed on Mount Washington and will serve as the local test and training facility. The second unit will be deployed to the South Pole a year for on-site testing.

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C41C-0995 0830h POSTER

Polar Regions: Natural Laboratories for Understanding the Dynamic Lithosphere-Cryosphere-Climate System

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The polar regions have unique geodynamic environments where the solid earth, the cryosphere, the oceans, the atmosphere and the global climate system are intimately linked. It is increasingly clear that deciphering the feedbacks and interactions between these spheres is required to comprehend the earth system as a whole. The ANTEC group has developed a vision for a major interdisciplinary program to investigate neotectonic processes in Antarctica, focused on understanding 1) how changing ice mass loads influence lithospheric stress/strain regimes; 2) how glacial isostatic adjustment and the tectono-thermal structure of the lithosphere control modern ice sheet dynamics; 3) the history of inception and growth of Antarctic ice sheets and how it's fluctuations are linked with tectonic motions and magmatism; and 4) how evolving continental-scale paleogeography, volcanism, erosion/sedimentation act to force climate change. We are poised at a critical threshold where developing technologies will enable experiments at unprecedented scales across the continent. Autonomous vehicles will allow exploration over unmapped ice sheets and under the ice shelves and sea ice that shroud immense portions of polar terrain. Unattended remote geodetic and geophysical observatories are beginning to operate through the polar night due to advances in power sources and data storage capacity. Drilling technologies are being adapted to the harsh polar environment and will allow us to sample the vast swaths of virtually unknown subglacial terrain. Spaceborne instruments now have an unprecedented capability to capture change in the polar environment. These emerging technologies will allow us to make the next great leap forward' in exploring the polar frontier of the earth system with immensely more ease than during the IGY 50 years ago. If we can meet the logistical and funding challenges of instrumenting the polar regions on a grand scale, we will reap a wealth data that will serve as the foundation for monitoring our dynamic physical environment far into the future.

URL: http://www.antec.scar.org

C41C-0996 0830h POSTER

Greenland: A Geophysical Target for the International Polar Year?

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Greenland is a unique geophysical target since it represents a coupled system of the solid Earth and the cryosphere on different spatial scales. Major open questions include the structure, the history and the thermo-mechanical properties of the bedrock, the crust, the lithosphere and the mantle as well as their interaction with the ice sheet. Modeling ice dynamics requires a detailed knowledge of the bedrock properties and the lithology to infer basal melting and ice flow. In studies of ice mass balance or the contribution to sea level change, geodynamic processes such as glacial isostatic adjustment and crustal deformation have to be taken into account. Examples of coupled processes are ice surface deformations, englacial and basal melting, which are related to the onset of fast flow and possibly to the migration of shear margins. The basal melt indicates higher than average crustal heat flow, which in turn can be associated with temperature variations in the crust/mantle and thus may be triggered by past and ongoing geodynamic processes. Geophysical observations in Greenland have a long history ranging from Alfred Wegener's first meteorological records in 1906 to the completion of the Arctic Gravity Project in 2003. Although the scientific database of Greenland is continuously growing, there are only minor efforts in the solid Earth community to exploit and evaluate the recently collected data and merge these with historic data. Further, the interaction between the geophysical and the glaciological community has not been fully developed. While atmospheric sciences and offshore geology of Greenland are well established, the large picture of Greenland's geological structure and history is still blurry. Past geodynamic activity, e.g. from a hotspot or rifting events, might have significant influence on present ice dynamics. Processes like glacial isostatic adjustment and glacier dynamics are shaping Greenland's surface. These processes must be observed with geophysical, geodetic and glaciological methods as a pre-requisite for further investigations. We like to initiate a concerted action (1) to collect further data (e.g. by airborne geophysical campaigns, seismic profiling, borehole logging), (2) to establish an integrated and interdisciplinary interpretation, and (3) to promote international cooperation (e.g. with Denmark and Germany). In addition, an initiative focusing on the analysis of existing data would be a desirable step. The International Polar Year provides an exceptional opportunity to combine expertise in the relevant fields, and to study the interaction of geophysics, geology and glaciology. Greenland as a science target has received less attention compared to Antarctica, which might have political and economic reasons. We propose to initiate a discussion to establish a program focusing on the solid Earth - cryosphere interaction and put Greenland on the agenda in the US polar research community for the International Polar Year.

URL: http://www-bprc.mps.ohio-state.edu/

C41C-0997 0830h POSTER

Barrow Ak: A Focal Point for Ice-Albedo-Transmission Feedback Processes in Arctic Sea Ice.

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The Arctic sea ice cover has measurably decreased in thickness, extent, and seasonal duration over the last two decades culminating in record or near-record fluctuations in 1998 and again in 2002 followed by a further strong melt season in 2003. Seasonal changes and short-term variability in the state of the ice cover and their effect on the interaction of solar radiation with the ice cover and underlying ocean are of particular importance in this context. Positive feedback processes associated with decreases in albedo and increasing transmissivity act to accelerate these changes. The rates of spring warming and summer melt as well as the length of the melt season are strongly influenced by the albedo, which in turn decreases as the melt season progresses. At the same time, increased transmission provides more energy to the upper oceanic mixed layer further increasing the potential for melting at the bottom of the ice. This ice-albedo-transmission (IAT) feedback plays a central role in modulating the heat and mass balance of the Arctic sea ice cover. Along the coastal contact zone, the feedback processes are even more complex due to interactions with the adjacent land surfaces. Indeed, this zone appears to be a focal point where the feedbacks are amplified. To understand and model the processes involved, it is necessary to determine how shortwave radiation is distributed within the ice-ocean system and how this distribution affects heat and mass balance. Analysis of this system is complicated by spatial and temporal inhomogeneity of the spring/summer ice cover, with surface conditions varying from deep snow to bare ice to melt ponds to open leads, and with ice thickness ranging from zero (open water) to ridges tens of meters thick, all within an area that is often less than one square km. Each of these categories has a different set of physical and optical properties. Treatment of the surface as a locally homogeneous medium with effective bulk optical properties represents a serious oversimplification that will significantly limit the predictive power of regional and large scale climate and dynamics models. An approach to dealing with this problem is to carry out surface-based observations of the processes involved to determine the detailed spatial and temporal variability associated with the various surface types and develop appropriate models to apply this information on larger scales. We argue that Barrow AK is critically situated for studies of the processes described above. We will present supporting results from a three-year observational sequence of heat and mass balance of the ice cover in conjunction with the interaction of solar radiation with the ice and adjacent tundra and lakes. This information allows us to make an accurate determination of partitioning of solar heating in this zone and provides the basis for IAT feedback modeling. We will also describe some modifications that will be important for generalizing to conditions attendant to increases in the length of the melt season. We propose that this type of study be continued during IPY 2007/08 and that Barrow Ak is an area of critical importance. It offers a key scientific location in combination with superior logistics support and extensive opportunities for K-12 outreach and support of higher education.

URL: http://www.arcticice.org

C41C-0998 0830h POSTER

Poles Apart? An Analysis of Research Practices in the Arctic and Antarctica

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The International Polar Years (IPY1, IPY2) and the International Geophysical Year (IGY) saw the evolution of individual research projects into decadal-scale programs involving large numbers of physical scientists. The upcoming IPY 2007-08 initiative progresses one step further by expanding research objectives to include economics, history, sociology, and other social sciences. To maximize the significance of IPY 2007-08, and follow historical precedent, progress toward a more holistic polar research program is required. This necessitates a transition from large-scale, collaborative efforts to interdisciplinary science plans. Here, we analyze survey data compiled from research projects funded in FY1999 by the Office of Polar Programs at the National Science Foundation to examine collaborative and interdisciplinary research at the poles. Our survey return rate was better than 40 %. Comparison of funded proposals from both Antarctic and Arctic regions shows that Arctic researchers tend to work in larger groups than their Antarctic counterparts; however, these coalitions are generally comprised of colleagues from the same institution or colleagues from institutions in proximity to the Arctic Circle. Antarctic teams, although smaller, are more geographically diverse. This implies that large-scale programs for research at southern high-latitudes may facilitate communication and scientific interactions to a greater extent than similar programs in the Arctic. Results from both Polar Regions indicate a decreasing trend in the quality of communication among research teams as the process evolves from an idea to publication. It is also clear that a majority of researchers do not differentiate between the terms "collaborative" and "interdisciplinary." Based on these and other data interpretations, we draw conclusions about the dynamics of research conducted within the framework of NSF. These results imply that the IPY should endeavor to (1) educate scientists about how to conduct interdisciplinary research independently or in teams; (2) interest and engage workers outside the geophysical community actively involved in polar research; and (3) actively facilitate and encourage communication among scientists.

C41C-0999 0830h POSTER

A 33-Year Data Set of Sea of Okhotsk Sea Ice Observations

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Studies have used satellite passive microwave derived ice concentrations to study the variability of sea ice in the Sea of Okhotsk, and its relationship to forcing factors such as atmospheric pressure systems. Passive microwave data provide a continuous record but are of relatively coarse resolution (about 25 km), which limits their utility for studying ice conditions in smaller seas. Land contamination, and smearing of the ice edge, are problems. The Japanese Meteorological Agency (JMA) has contributed digitally encoded versions of operational sea ice charts to the World Meteorological Agency's Global Digital Sea Ice Data Bank project. The charts are composed of observations from shore-based radar, ship and aircraft observations, and satellite data. There is one chart every 5 days, for December through May of each year. Total concentration from the charts has been mapped to a 12.5 km equal area grid. Monthly summary statistics, including frequency of ice occurrence, maximum, median and minimum concentration and median extent, have been derived. The results have been compared with results from the satellite passive microwave record. In addition to offering better resolution, the JMA data are less biased by surface melt effects than are passive microwave data.

C41C-1000 0830h POSTER

Satellite Observation of Spring Ice Breakup on Large Northern Rivers

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The annual spring breakup of river ice plays a major role in physical, biological, and human systems on large arctic rivers. In addition, the timing of breakup has been used as a proxy for regional climate variations over the past century or more. However, most observations of ice breakup have been recorded in the form of point data taken from selected ground-based stations. While important, the use of this point-scale data presents difficulties in understanding both the process and the timing of ice breakup. More specifically, it is unknown whether observations of ice breakup taken at one point on a river are representative of breakup patterns along the entire course of that river. Through the use of a daily time series of satellite images, a technique has been developed through which ice breakup may be observed and mapped along the entire length of a river. The technique has been applied to the Lena, Ob, Yenisey, and Mackenzie Rivers for 1992-1993 and 1995-2003, with precision as good as plus or minus one to two days covering at least 75% of observations. While not universal, breakup seems to follow similar patterns on a given river from year to year, with variability of breakup date generally between 10 and 30 days depending on location. Patterns in the timing of breakup seem to be related to a number of factors, with latitude, location of confluences with major tributaries, and degree of braiding playing significant roles.

C41C-1001 0830h POSTER

A High Speed, Long-Range Mobile Communications Link for use in Polar Regions

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The Polar Radar for Ice Sheet Measurements (PRISM) project has developed a high bandwidth, wireless communications link between an autonomous rover and a manned vehicle deployed on a polar ice sheet to exchange real-time video, timing signals for a bistatic radar, and rover sensory data. The PRISM project is developing advanced intelligent remote sensing technology that involves radar systems, an autonomous rover, and communications systems to measure detailed ice sheet characteristics, and to determine bed conditions (frozen or wet) below active ice sheets in both Greenland and Antarctica. While this wireless communications link is being developed to fill a need within the PRISM Project, the same technology will allow polar researchers separated by moderate distances (∼10 km) to exchange data. The communications link is based on a high data rate 802.11b wireless technology, and a prototype system has been tested and evaluated during field experiments conducted at the NorthGRIP ice core drilling camp in Greenland (75° 06′ N, 42° 20′ W) from June 23-July 17, 2003. The IEEE 802.11b standard works in the 2.4-2.483 GHz band and has been widely used for high-speed data transfer in a WLAN (Wireless Local Area Network). It typically has a range of a few hundred meters and theoretical data rates on the order of 11 Mbps. It has been used for a number of applications in home and office environments. We modified a 802.11b system to operate up to a maximum distance of about 8 km and investigated the radio propagation environment over the flat terrain of the Greenland ice sheet. We evaluated its performance along three different tracks of 8 km in length, and made throughput measurements at intervals of 0.5 km. We measured the received signal strength and noise level in 2-s intervals along these 8 km tracks. Also we conducted experiments for four different antenna heights (1, 2, 3 and 5 m) for developing a radio propagation model for WLAN communication over the ice sheet. We found that peer-to-peer communication between nodes on the ice had data rates varying from 4.5 Mbps at close range to 2.5 Mbps at a distance of 8 km from the base station. The design, propagation model, throughput and coverage of this peer-to-peer communications system in Greenland are presented in this paper. This WLAN system has numerous applications in polar field camps. We tested the transfer of real-time video segments across this link for our educational outreach efforts in the field. These video segments were subsequently uploaded using an Iridium-based Internet link, and sent back to the University of Kansas. The wireless Internet connectivity was also made available to members of the North Grip camp, who were able to access e-mail and the Internet from their tents and common areas. However, throughput for wireless access to the Internet was limited by the Iridium-based Internet connection that had a maximum bandwidth of 9.6 Kbps.

C41C-1002 0830h POSTER

Historical Arctic and Antarctic Surface Observational Datasets

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A new historical data set of surface observational data from several station locations in the Arctic and Antarctic is now available through the National Snow and Ice Data Center (NSIDC) Distributed Active Archive Center (DAAC). This product consists of basic meteorological data extracted from the National Climatic Data Center (NCDC) DATSAV2 and DATSAV3 surface observation data base. The mandatory data section contains meteorological information on basic parameters such as wind speed and direction, surface pressure, air temperature and visibility. These are the most commonly reported parameters and are available most of the time. The data are stored in ASCII files for each station and year that data are available and browse images are also provided. There are a total of 104 stations for the Arctic and 136 for the Antarctic. The time period of coverage starts as early as 1913 in the Arctic and extends through 2002, although data gaps occur and data are available for different years at different stations.

C41C-1003 0830h POSTER

Arctic Sea-Ice Measurement from Aircraft

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Monitoring sea ice thickness has proven difficult and numerical models are plagued by a scarcity of in situ data in the polar regions. Satellites cannot directly measure ice thickness, but the possibility exists of estimating ice thickness from ice freeboard measurements from new ESA and NASA altimetric satellites. Measuring ice freeboard from satellites, however, poses a significant scientific challenge. We discuss a method to measure ice freeboard using radar and laser altimeters aboard a P-3 aircraft, where the lower aircraft altitude reduces many of the measurement ambiguities, with the goal of improving satellite freeboard measurement. From airborne freeboard estimates, ice thickness is inferred from assumptions of snow, ice, and water density and verified using various ground-truthing opportunities. We present estimates of ice thickness from our existing extensive radar-altimetric sea-surface topography data set (1992-1999) that spans two-thirds of the Arctic Ocean basin. Ultimately, the goal is to convert satellite altimeter measurements to ice thickness estimates for model inputs to yield near-real-time ice thickness estimates.

C41C-1004 0830h POSTER

The New Polar Explorers of the 21st. Century: Autonomous Vehicles

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Throughout the history of polar exploration and research, the difficulties and hazards of the polar environments have proven to be daunting and sometimes deadly. Field efforts require extensive planning and logistics support while deployment and operation of research instruments is limited by power availability, maintenance requirements and access. At a time when the high latitudes are increasingly recognized as bellwethers of climate change, the observation network for the polar regions remains considerably less extensive than is the case for lower latitudes. In some cases, such as arctic drifting camps and coastal weather stations, the monitoring network is actually decreasing. Furthermore, for critical measurements such as sea ice thickness, no direct means currently exist for obtaining spatially and temporally distributed surface measurements. While satellite data promise to provide useful insights into ice mass and several key atmospheric and oceanic conditions, the need still exists for accurate, extensive surface measurements of sea ice and its variability in space and time. As we move into the 21st. century, new methods of observing the Polar Regions need to be implemented - methods that can overcome many of the present limitations listed above. Autonomous vehicles provide one such approach. Through advances in electronics and other essential technologies, it is now possible to deploy robotic vehicles that can operate in the ocean, on the ice and land, and in the sky. Presently, a variety of autonomous vehicles applicable to the Polar Regions are being designed and, in some cases, deployed and operated in the high latitude regions. The IPY offers a unique opportunity to develop a consistent, polar-wide observing network. Such an observing network would include autonomous vehicles combined with more intensive measurements obtained using other methods at key locations around the Arctic rim and in Antarctica. These vehicles bridge the gap between sparsely distributed, existing measurement sites and weather stations, localized and infrequent aircraft campaigns, and extensive but limited information provided by satellites. As an example, one can envision a combination of field measurements, piloted aircraft, surface rovers, robotic aircraft, and satellite observations used to map spatial variability and interannual changes in sea ice thickness. The proposed observing network would be coupled to a suite of oceanic and atmospheric measurements to understand the forces that drive the formation, drift and melt of the ice cover. The result would be improvements in weather and ice forecasting, climate modeling and remote sensing algorithms. Together, such an observing network would provide accurate and detailed information needed to detect climatic changes unambiguously.

C41D MCC: 3002 Thursday 1020h

Snow Cover and Biogeochemical Cycling I *(joint with B, H)*

Presiding: **M Sturm,** Cold Regions Research and Engineering Laboratory Alaska**; P D Brooks,** University of Arizona

C

C41D-01 1020h INVITED

The Interaction of Snow Physical Processes With Vegetation in Open and Forested Biomes

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It is well accepted that the physical processes which drive snowcover accumulation, redistribution, transformation and ablation are intimately governed by their interaction with the properties of both local and regional vegetation. It is more recently accepted that the type, structure and spatial distribution of vegetation are themselves affected by snow processes such that natural snow-vegetation-climate systems have evolved distinctive characteristics in various cold regions biomes. The human ecology of snow-vegetation systems is less well known, but extremely important as vegetation is managed to promote beneficial snow characteristics for the purposes of agricultural management in many snowy cultivated farming regions of the world. This paper will review recent field observations and descriptions of characteristic snow process-vegetation interactions and phenomena in various circumpolar biomes and the potential transferability of observed processes and snow-vegetation relationships amongst biomes in the circumpolar world. The spatial distributions of processes and states within a biome are shown to have important implications for aggregated descriptions of snow at the biome scale; the stability of these distributions will be emphasised.

C41D-02 1035h INVITED

Relating Snow Transport to Ecosystem Structure and Function: Lessons from Libby Flats

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The effects of variable snow cover on ecosystem structure and function have been well-documented in cold, temperate ecosystems, especially in high-elevation treeline and alpine landscapes where long, windy winters can produce dramatic variations in snow depths over short distances. Additionally, wind directions, snowfall, and resultant snow-distribution patterns are essentially the same year after year, allowing for relatively steady state environmental conditions and ecosystem properties. These chronic and heterogeneous snow-cover patterns have been associated