

Nearshore and Coastal Processes Initiative Online Forum January 30–February 1, 2002

Introduction

ARCSS Planning Discussion > Introduction > Nearshore and Coastal Processes Initiative

Post Title: Nearshore and Coastal Processes Initiative

Posted by: *Lee Cooper* at 1:38 AM 1/27/2002

The Nearshore and Coastal Processes Initiative focuses on the scientific challenges of environmental change in human and biological communities, and related physical and chemical systems, at the land-sea margin in the Arctic. This online discussion, as well as the Nearshore plenary and breakout sessions at the upcoming ARCSS All-Hands Workshop, will help lay the groundwork for coordinated, interdisciplinary research in the Arctic focused on the coastal zone.

Crucial research questions relating to environmental change in the Arctic have not been adequately addressed because interdisciplinary research efforts in Arctic coastal zones have been rare. Many scientific issues requiring complex, interdisciplinary research approaches have been identified at the land-sea margin in the Arctic. A non-exhaustive list would include:

- * the impacts of changes in precipitation and runoff patterns on Arctic Ocean circulation
- * sea-ice formation and distribution
- * the biogeochemical fate of materials transported in rivers and from eroding coastlines
- * the impacts of climate warming on on-shore and offshore permafrost and the release of radiatively active gases
- * the social stresses on human communities in the North that political and environmental changes in the past few decades have brought

It is likely that no one disciplinary approach (e.g. permafrost history, hydrology, coastal physical oceanography, etc.) by itself can produce the synoptic understanding that is needed to predict and respond to environmental change in the Arctic.

The scientific data currently available to prepare for widespread environmental change in the Arctic as a whole are largely inadequate. Many Arctic processes that potentially affect global climate are not well studied and associated mechanisms are not well understood. In certain regions of the Arctic Ocean, including its shelves, there is only a minimal description of circulation, hydrography, and seasonal variability. Likewise, the few data pertaining to biological productivity and the fate of this production are so broadly distributed in time and space that it is difficult to distinguish temporal from spatial variability.

Therefore, the primary goal of the Arctic Nearshore and Coastal Processes Initiative is to improve our understanding of the biogeochemical and hydrological processes that occur on the nearshore zone of the arctic shelf and coastal plain with respect to changes in global climate. This international, multi-agency initiative would support land, river, and sea-based researchers who could take advantage of coordinated logistical capabilities that would otherwise be unavailable.

We invite you to share your ideas and knowledge with us during this online forum and at the ARCSS All-Hands Workshop in Seattle.

Thank you for your participation,
Lee Cooper
Ken Dunton

Post Title: Re: Nearshore and Coastal Processes Initiative (Lee Cooper)

Posted by: *Jerry Brown* at 4:40 PM 1/30/2002

Folks: before we get started, I would like to draw your attention to an international coastal project that will be relevant to the nearshore initiative. The Arctic Coastal Dynamics (ACD) program was designed with a community based monitoring program involving local observers including students. I suggest we try to incorporate this approach into the planning.

Jerry

Arctic Coastal Dynamics (ACD)

<http://www.awi-potsdam.de/www-pot/geo/acd.html>

Arctic continental shelves comprise 30% of the area of the Arctic Ocean and contribute about 20% of the world's continental shelf area. This extensive circum-Arctic coastal margin, about 200,000 km long, is the interface through which land-shelf exchanges are mediated. Sediment input to the Arctic shelf resulting from erosion of ice-rich, permafrost-dominated coastlines may be equal to or greater than input from river discharge. Determining sediment sources and transport rates along high latitude coasts and inner shelves is critical for interpreting the geological history of the shelves and for predictions of future behavior of these coasts in response to climatic and sea level changes.

Though generally only a few kilometers wide (except in the vicinity of large deltas), the coastal zone of the Arctic Ocean is the site of dramatic changes in not only the land and ocean but also in the cryosphere and biosphere. The Arctic coastlines are highly variable, can be stable or extremely dynamic and are the site of most of the human activity that occurs at high latitudes. Extraction of natural resources occurs in many locations around the Arctic Ocean creating the need for port facilities and the potential for pollution. These pressures are only likely to increase with time.

Arctic Coastal Dynamics (ACD) is a multi-disciplinary, multi-national forum to exchange ideas and information. The project elements were formulated at a workshop in Woods Hole in November 1999 sponsored by the U.S. National Science Foundation and carried out under the auspices of the International Permafrost Association (IPA), its working group on Coastal and Offshore Permafrost and its coastal subgroup. As a result of the workshop a metadata form for the selection and establishment of key monitoring sites was developed. A consistent and generalized coastal classification scheme was established based on morphology and materials. Consensus was reached on direct and indirect methodologies for estimating ground-ice volumes and presentations of data on maps. Finally, a suite of standard tools and techniques for development of long-term coastal monitoring sites was recommended. Two subsequent IASC-sponsored workshops have been held in Potsdam. (see web for newsletters, workshop reports, abstracts, databases, and methods).

A five-year, ACD Science and Implementation Plan presents two interrelated components: (1) a series of coordinated, synthesis activities, and (2) proposed focused research projects and long-term observations.

The overall objective of ACD is to improve our understanding of circum-Arctic Coastal Dynamics as a function of environmental forcing, coastal geology and cryology and morphodynamic behavior. In particular, we propose to:

- * establish the rates and magnitudes of erosion and accumulation of Arctic coasts;
- * develop a network of long-term monitoring sites including local community-based observational sites;
- * identify and undertake focused research on critical processes;
- * estimate the amount of sediments and organic carbon derived from coastal erosion;
- * refine and apply an Arctic coastal classification (includes ground-ice, permafrost, geology etc.) in digital form (GIS format);
- * extract and utilize existing information on relevant environmental forcing parameters (e.g. wind speed, sea level, fetch, sea ice etc.);
- * produce a series of thematic and derived maps (e.g. coastal classification, ground-ice, sensitivity etc.);
- * develop empirical models to assess the sensitivity of Arctic coasts to environmental variability and human impacts.

Post Title: Re: Nearshore and Coastal Processes Initiative (Lee Cooper)

Posted by: *Tom Dunning Newbury* at 3:15 AM 2/1/2002

Lee's introductory statement mentions "the scientific challenges of environmental change." The focus of the ARCSS research has been integrated processes, but I think that the challenge to which Lee refers should become the next focus of the ARCSS research. The second item in Lee's "non-exhaustive" list is sea-ice formation and distribution. I think this should be the first priority and should be modified slightly to "the impacts of climate-related changes in sea-ice distribution."

Climate change is being funded by NSF in other oceans (Atlantic, Pacific. . .) but the Arctic has a unique ice cover that has a broadscale effect on meteorological processes. Impacts of changes in the ice cover would interest more than just arctic scientists. The impacts would interest all National citizens--and all Northern Hemisphere citizens.

The ARCSS program is an excellent one for this challenge because of its integrated, organized approach to arctic science. I am not an active arctic researcher, but I think that ARCSS has fostered excellent research. I am more impressed by ARCSS-sponsored research than, for example, the less-well integrated SEARCH-sponsored research.

The messages by Lee, Jerry and other mentions other priorities that tend to focus on regional issues, such as erosion, ecology, etc. Examples are Jerry's suggestions of the Arctic Coast Dynamics with a focus on erosion, and of community-based monitoring programs. These are good suggestions, but I think they should be secondary to the broadscale impacts of climate-related changes in arctic sea-ice distribution.

Post Title: Re: Nearshore and Coastal Processes Initiative (Lee Cooper)
Posted by: *igorsm* at 5:56 AM 2/1/2002

Is the Nearshore Initiative a Pan-Arctic project, or just Alaskan?
Is it related with RAISE: I see many similarities between both?

Post Title: Re: Nearshore and Coastal Processes Initiative (igorsm)
Posted by: *Steve Zeeman* at 2:30 PM 2/1/2002

I should probably let Lee or Ken answer this, but from the discussions in Salt Lake, it is my sense that the nearshore initiative and RAISE would be closely linked. The nearshore discussions were focused more broadly, and leaned more to a Pan-Arctic view. Some thoughts were that this initiative would be housed under the RAISE umbrella, because the aims were so similar, and RAISE was much further along in the planning. (somebody out there correct me if I'm wrong about this.)

Post Title: Re: Nearshore and Coastal Processes Initiative (Steve Zeeman)
Posted by: *Ken Dunton* at 2:53 PM 2/1/2002

Steve,

You are absolutely correct with respect to the linkage between RAISE and the proposed Nearshore Initiative. I don't think anyone can tell you how they will be formally tied together (we are still at a very early planning stage). Sorry for the brief response, but I have to go to class.

Ken Dunton
Marine Science, UT-Austin

Post Title: Re: Nearshore and Coastal Processes Initiative (Ken Dunton)
Posted by: *Lee Cooper* at 7:03 PM 2/1/2002

This is just my opinion, of course, but I see the Nearshore Initiative and RAISE as two parallel science planning processes that intersect, overlap and complement each other. The Nearshore Initiative is not geographically limited, except to the land-sea margin in the Arctic, and as I covered in another post, we certainly consider the Bering Sea and other "sub-arctic" areas to be appropriate places to encourage additional research. The scope of RAISE is limited to the Russian Arctic, but for any Nearshore Initiative to be successful, we will have to improve research capabilities and opportunities in Russia because the Eurasian land-mass is such a key variable in the Arctic system because of its size, runoff influence, environmental change feedbacks, etc.

That's the short answer. I've clipped some text below out of our draft RAISE/Nearshore/Land-Shelf Interactions science planning document that can be downloaded from <http://www.raise.uaf.edu> that gives some of the history of the initiative and its relationship to RAISE. We are looking for contributions to this writing effort, between now and the All-Hands Meeting, as well as there in Seattle and thereafter. Additional information is available on the RAISE web page.

Hope that is helpful,

Lee Cooper

From the draft science plan: This science planning effort is particularly focused on the goal of supporting coordinated research efforts in the near-shore areas of the Russian Arctic whether on land, in freshwater estuaries, or on adjoining coastal shelves and islands. However, it is not meant to exclude efforts to continue on-going or initiate proposed individually-based project research under the RAISE umbrella. Our science planning effort is also meant to highlight research needs in Arctic coastal zones in general, and to build support for coordinated arctic research efforts in coastal zones throughout the Arctic. Within the United States arctic scientific research community, it is widely recognized that many crucial research questions relating to environmental change in the Arctic have not been adequately addressed because interdisciplinary research efforts in Arctic coastal zones have been rare. In November 2001, in Salt Lake City, Utah, at a joint plenary session of arctic researchers funded through the U.S. National Science Foundation's Land-Atmosphere-Ice Interactions (LAI) and Ocean-Atmosphere-Ice Interactions (OAI) components of the Arctic System Science (ARCSS) program, considerable attention was devoted to the development of a "Nearshore Initiative," or Land-Shelf Initiative, that would help address many crucial environmental research problems that are intrinsic to the land-sea boundary. A copy of a Microsoft PowerPoint presentation used at the Salt Lake City meeting, which outlines the research needs that could be met with the development of a Nearshore Initiative, can be downloaded from the RAISE web site, <http://www.raise.uaf.edu> Following these presentations and open discussions in Salt Lake, a joint meeting of researchers serving on science steering committees for the LAI, OAI, and RAISE components of formally considered the desirability of a Nearshore (or Land-Shelf) Initiative in the Arctic. It was jointly resolved that additional planning efforts to improve capabilities for near-shore research in the Arctic should be supported. Consistent with this recommendation, additional discussion of scientific research needs at the land-sea boundary in the Arctic will take place at the ARCSS All-Hands Workshop, to be held 20-23 February 2002 in Seattle (<http://www.arcus.org/ARCSS/allhands2002/index.html>) The purpose of the ARCSS All-Hands Workshop is to assess the state of the art in research on global change, environmental impacts, and biocomplexity, emphasizing arctic and global aspects. In addition, gaps in knowledge and areas for research integration will be identified, and several new research initiatives, including Arctic nearshore and coastal processes will be considered in working group discussions and plenary sessions. We expect that the opportunities provided by the Salt Lake and Seattle meetings, as well as previous deliberations within RAISE principal investigator and science steering committee meetings, will assure opportunities for diverse and representative scientific community contributions and will lead to practical strategies for improving interdisciplinary research opportunities at and near the Arctic land-sea boundary.

While the ARCSS Land-Shelf Initiative is broader geographically than the RAISE program focus on the Russian Arctic land-shelf region, the RAISE program has historically been one of the key ARCSS mechanisms for supporting global change research beyond the relatively small portion of the Arctic shared by the United States. The objective of RAISE specifically has been to facilitate cooperation between Russian and U.S. scientists that would improve knowledge of Arctic system science at the land-sea margin of the large portion of Arctic coastline that is in the Russian Federation. With respect to U.S. programmatic research on global and arctic environmental changes, RAISE occupies a boundary between U.S. ARCSS research that is addressing environmental change on land (LAI) and a parallel environmental change program in the ocean, OAI. A RAISE project office is currently supported by NSF at the University of Alaska Fairbanks and annual meetings of principal investigators and the RAISE science steering committee provide program guidance. Although a number of projects have been initiated under the RAISE umbrella (see <http://www.raise.uaf.edu>) with support from the Office of Polar Programs of the NSF, as well as allied projects supported by the Russian Foundation for

Basic Research (RFBR), it has been recognized that it is particularly challenging to mount bilateral research in near-shore waters of the Russian Arctic, owing to the need for coordinated ship support in such remote areas, as well as the additional permitting requirements for conducting research in Exclusive Economic Zones under international law. END QUOTE

Post Title: Re: Nearshore and Coastal Processes Initiative (Lee Cooper)

Posted by: *Tom Dunning Newbury* at 5:30 AM 2/3/2002

Thank you, Lee; your reply helped to answer my questions.

I realize that the session has closed, but I want to note that the educational value of the proposed research was mentioned frequently. I agree that there is great educational value; the past role of NARL in Barrow is an excellent example. However, I think that the State of Alaska has primary responsibility for education of its citizens; we should look to the State for funds to add educational aspects to the nearshore research projects. I think that we should not expect such help with local education from the the Federally-funded NSF. (If NSF granted research funds on the basis of the local educational value, the states with the largest populations would get most the funds.) An obvious exception is the community-based monitoring on the Diomedes; working with and training the local citizens is probably the only way to conduct the research within budget.

Post Title: Re: Nearshore and Coastal Processes Initiative (Tom Dunning Newbury)

Posted by: *Lee Cooper* at 12:32 AM 2/5/2002

This is a good point that Tom makes; states and local school boards have primacy in education in the USA. Despite this, there are funds within NSF that are outside of Polar Programs that are designated for improving education, including at K-12 levels, and we can accomplish more if we tap into those funds. Also working in remote areas, we need all the help we can get, so if local residents can identify with our efforts as being something worthwhile instead of just a distant government spending money for whatever reason, I think we will also come out ahead. I think all of the attention that was paid in this forum to the educational value of research in the arctic nearshore zone (where a high proportion of arctic residents live and interact with their environment) is good evidence for the mutual payback that is possible if scientists and local arctic residents can work together.

Lee Cooper

**How can we overcome the challenges of
conducting research that is useful to human
society across political and cultural boundaries?**

ARCSS Planning Discussion > How can we overcome the challenges of conducting research > Start here

Post Title: Start here

Posted by: *admin* at 7:22 PM 1/29/2002

How can we overcome the challenges of conducting research that is useful to human society across political and cultural boundaries?

Post Title: Welcome

Posted by: *Lee Cooper* at 8:06 AM 1/30/2002

First, thank you for taking the time to register and to consider contributing to this Arctic Research Consortium of the United States (ARCUS) forum for scientific research planning on nearshore research in the Arctic. Some additional information on the Nearshore Initiative is available at the website for the Russian American Initiative for Shelf Land Environments in the Arctic (RAISE) website, <http://www.raise.uaf.edu> The point of this forum is to incorporate information from scientists, arctic residents, agency representatives, and others with an interest in the scope and direction of research in the Arctic coastal zone. Although some of the most relevant information about the need for coastal zone scientific research in the Arctic is being developed and posted on the RAISE website, our efforts here are not limited by geography or research program. Information and views posted here will be incorporated into program planning at the National Science Foundation's Arctic System Science Program (ARCSS) meeting planned for Seattle, Washington, U.S.A. for February, 2002.

The questions posed on the main page for this on-line forum are meant to stimulate discussion. As moderators, we welcome comments and information on any aspect of this research challenge.

Post Title: Re: Welcome (Lee Cooper)

Posted by: *George Hunt* at 8:40 PM 1/30/2002

Lee and others:

I am only a part-time Arctic researcher, and I am curious whether you see this research confined to the Arctic ocean proper, or if you are taking a broader view of the Arctic? In the Bering Sea, timing of ice retreat and integrated water temperature at the time of the bloom appear to be critical determinants of the fate of production. The candidate mechanism is the temperature dependence of physiological processes in zooplankton. The marginal Arctic Seas with seasonal ice cover provide an interesting model system to look at what the Arctic Ocean may be like when it too has seasonal ice cover and is warmer. Compartmentalizing research by ocean basin may be necessary for budget or political reasons, but it may stifle interesting comparisons with other systems. It would be of considerable interest to compare seasonal marginal ice zones in the Barents Sea, The Bering Sea, and the Antarctic to explore how timing of opening of the water, the water temperature and nutrient availability influence the amount and fate of production. These questions certainly relate to the ability of fisheries to sustain harvests

and to the distribution and abundance of marine mammals and seabirds used by indigenous peoples.

Post Title: Re: Welcome (George Hunt)

Posted by: *Lee Cooper* at 6:08 AM 1/31/2002

Hi, George,

Of course the Bering Sea is considered part of the Arctic by U.S. government agencies funding research out there, so there is no reason to limit this discussion or initiative to the Arctic Ocean proper. Having said that, there are probably good reasons to separate the Bering out for its own research attention because some of the environmental change challenges are quite different, and the ecosystem is quite distinct from most of the Arctic Ocean. And I don't think some of the issues people raise in the higher Arctic are necessarily the same as the changes we have seen in the Bering over the last few years, including those you have reported on. But the issue of seasonal ice cover impacts on the Bering Sea as a means to understand how the Arctic Ocean marginal seas (i.e. East Siberian, Chukchi, Laptev) might behave in a changed climate regime seems quite germane. Since the Bering is transitional between the Pacific and the Arctic, I think it is more a question of perspective or integration of what is happening in a marginal sea that links the Arctic to the Pacific.

Lee Cooper

Post Title: Re: Welcome (Lee Cooper)

Posted by: *Steve Zeeman* at 6:33 PM 1/31/2002

Hi All,

George raised a good issue. Perhaps as Lee states, not all the same concerns arise in the Bering as opposed to the higher Arctic. Some issues however, might be the same, and the Bering may contribute to the cause and/or solution of those issues. For example, at the Salt Lake meetings I heard a lot about erosion as being a possible concern around the Arctic. Is that also true of coasts around the Bering? Information developed in one area, may also be useful in another. Can synergistic advantages be achieved by looking at these other areas? Hypotheses regarding seasonal ice cover, erosion rates and other characteristics, could be tested using data from marginal seas and the Arctic either as contrasting or similar sites. The Gulf of Anadyr may provide some real interesting data in regard to runoff, nutrient inputs, and erosion resulting from climatic changes - and these would ultimately have an impact on the Chukchi shelf. We should probably not eliminate questions until a reasonable attempt has made to discuss the implications. It may very well be that fiscal resources ultimately limit the scope, but we should at least allow the science to drive the questions. (I think that is also what Lee was trying to say.)

Post Title: Re: Start here (admin)

Posted by: *Henry Huntington* at 7:14 PM 1/31/2002

The original question was about political and cultural boundaries, and perhaps "scientific" or administrative boundaries such as the Bering Sea/Arctic are relevant, too. Arctic science tends too often to be isolationist, claiming that things are different in the Arctic, and can't be compared with lower latitudes. I think this is largely nonsense. Sure, there are differences, but those

differences provide opportunities for comparison and contrast, not dismissing the rest of the world from consideration.

Now, off my soapbox, conducting research and applying results across human boundaries is time consuming, costly, and often frustrating, as anyone knows who has tried to do international projects. It is also very rewarding, and ARCSS has done a good job of supporting this work, particularly with regard to Russia. The key, just like working with Arctic communities, is taking the time to build relationships and to establish programs that keep going so those relationships can be used and strengthened, rather than having to be re-created each project. This often means a greater emphasis on science planning activities, such as workshops and planning sessions, so that practical and worthwhile collaborative projects can be developed. Again, ARCSS has a good track record, and this effort should continue.

Earth system history

ARCSS Planning Discussion > How will earth system history research approaches be important > Welcome statement

Post Title: Welcome statement

Posted by: *Lee Cooper* at 7:46 AM 1/30/2002

First, thank you for taking the time to register and to consider contributing to this Arctic Research Consortium of the United States (ARCUS) forum for scientific research planning on nearshore research in the Arctic. Some additional information on the Nearshore Initiative is available at the website for the Russian American Initiative for Shelf Land Environments in the Arctic (RAISE) website, <http://www.raise.uaf.edu> The point of this forum is to incorporate information from scientists, arctic residents, agency representatives, and others with an interest in the scope and direction of research in the Arctic coastal zone. Although some of the most relevant information about the need for coastal zone scientific research in the Arctic is being developed and posted on the RAISE website, our efforts here are not limited by geography or research program. Information and views posted here will be incorporated into program planning at the National Science Foundation's Arctic System Science Program (ARCSS) meeting planned for Seattle, Washington, U.S.A. for February, 2002.

The questions posed on the main page for this on-line forum are meant to stimulate discussion. As moderators, we welcome comments and information on any aspect of this research challenge.

Why did we pick the questions we did?

Here's a short synopsis:

The study of past climate has been of key importance to understanding the scope and speed that the earth has changed in the near and distant past. For anthropogenic change that we will see (if we haven't seen it already), how important is understanding past natural shifts in climate? Is that a research approach that is viable and important?

Post Title: Re: Welcome statement (Lee Cooper)

Posted by: *Henry Huntington* at 7:05 PM 1/31/2002

Given some of the difficulty of distinguishing natural vs. anthropogenic forcing of climate, it seems to me essential that we understand as much as we can about natural changes in the past. There may not be perfect analogs to current conditions and trends, but identifying past dynamics, especially in terms of cycles and oscillations as well as directional shifts, is critical to understanding the nature of the system. Having said all that, we need to be careful with our interpretation of paleo data so that we don't read into it more than the record actually supports.

As for research on past natural changes that will help us understand the implications of anthropogenic forcing, I'm out of my depth, but it seems that identifying specific changes that take us into new territory (e.g., CO₂ at higher levels than any time in the past several hundred thousand years) is a start. If we can understand what kept, e.g., CO₂ levels bounded in the past, that might help us explain why they are still rising now (obviously, burning of fossil fuels, but will they keep rising indefinitely, or is there some sort of buffering mechanism that has worked in the past but is now being overwhelmed by the sheer volume of CO₂ we're producing?).

ARCSS Planning Discussion > How will earth system history research approaches be important > Gas Hydrates in the Arctic

Post Title: Gas Hydrates in the Arctic

Posted by: *Giles* at 11:19 PM 1/31/2002

Methane hydrates are found worldwide at high pressures and low temperatures in narrow bands on continental shelves and in permafrost. These gas hydrate accumulations contain about twice the carbon in all known gas, oil, and coal deposits. Since methane is a greenhouse gas ten times more potent than carbon dioxide, the formation and dissociation of methane hydrates produce both positive and negative feedbacks to climate change. Evidence from the past suggests that large-scale venting of gas deposits trapped below gas hydrates are extreme events that have the potential to alter climate and biogeochemical cycles on a global scale. Global warming may affect the rate of release of methane from gas hydrate deposits in both the ocean and terrestrial permafrost. In turn, this release could accelerate global warming trends beyond the current IPCC predictions. Since methane hydrate deposits are large and responsive to changes in temperature and pressure, the potential for methane hydrate to force climate change is significant.

Relatively little is known about controls on methane release. For example,

- Where exactly are these gas hydrates located?
- How big are these deposits?
- How stable are these deposits under current environmental conditions?
- How responsive will these deposits be to global warming?

The Nearshore and Coastal Processes Initiative may be a good home to address these gas hydrate questions because:

- In the Arctic, gas hydrate deposits are found in both the ocean and in terrestrial permafrost.
- Temperatures in the Arctic are predicted to increase more rapidly than in lower latitudes.
- Addressing these questions will necessitate a broad range of scientific expertise.
- This would make an excellent case study to broaden our understanding of gas hydrate stability in a real world environment.

Post Title: Re: Gas Hydrates in the Arctic (Giles)

Posted by: *Lee Cooper* at 5:55 PM 2/1/2002

Giles (and other interested),

I think that gas hydrates is a very important topic that hasn't been addressed except in the most peripheral way in ARCSS research. The arguments you make regarding the carbon stored, the feedbacks of gas hydrate release etc. are persuasive. My follow-up question regards how will this Nearshore Initiative interface with other U.S. research programs studying gas hydrates? I know that the Department of Energy has had a multi-million dollar effort in this area, and I expect that a lot of that is practically-oriented, and certainly not much has been done in the Arctic yet relative to the publicity about gas hydrates coming up in dredges (I think) off Oregon. So in a sense, my question is how are the other agencies and industry addressing the research needs, and how will NSF through ARCSS best help in this effort?

Post Title: Re: Gas Hydrates in the Arctic (Lee Cooper)

Posted by: *Giles* at 7:15 PM 2/2/2002

Lee and Others: This is a good question. Let's not reinvent the plow. The federal agencies that are most actively involved in gas hydrate research are USGS and DOE. Here are a couple of INTERNET sites that discuss their work: <http://marine.usgs.gov/fact-sheets/gas-hydrates/title.html> and http://www2.fossil.energy.gov/oil_gas/methanehydrates/ From the latter site, you can access a project description on the North Slope that is developing tools and plans for drilling, coring, and production testing of hydrate stability zones in northern Alaska. It appears to me from a brief review of what DOE is doing in gas hydrate research is that it primarily involves methane production or sequestration in deep seas of excess CO₂. USGS stuff may be more basic research. In any case, we need to evaluate exactly what other agencies are doing before committing NSF funds. I will research this issue and have more info by the workshop date.

How will the Nearshore Initiative connect with researchers who primarily work on land?

ARCSS Planning Discussion > How will the Nearshore Initiative connect with researchers who primarily work on land? > Start here

Post Title: Start here

Posted by: *admin* at 7:24 PM 1/29/2002

How will the Nearshore Initiative connect with researchers who primarily work on land?

Post Title: Welcome to the discussion

Posted by: *Lee Cooper* at 8:03 AM 1/30/2002

First, thank you for taking the time to register and to consider contributing to this Arctic Research Consortium of the United States (ARCUS) forum for scientific research planning on nearshore research in the Arctic. Some additional information on the Nearshore Initiative is available at the website for the Russian American Initiative for Shelf Land Environments in the

Arctic (RAISE) website, <http://www.raise.uaf.edu> The point of this forum is to incorporate information from scientists, arctic residents, agency representatives, and others with an interest in the scope and direction of research in the Arctic coastal zone. Although some of the most relevant information about the need for coastal zone scientific research in the Arctic is being developed and posted on the RAISE website, our efforts here are not limited by geography or research program. Information and views posted here will be incorporated into program planning at the National Science Foundation's Arctic System Science Program (ARCSS) meeting planned for Seattle, Washington, U.S.A. for February, 2002.

The questions posed on the main page for this on-line forum are meant to stimulate discussion. As moderators, we welcome comments and information on any aspect of this research challenge.

Why did we pick the questions we did?

Here's a short synopsis for this question:

One of the great challenges of recent arctic research has been the difficulty of linking marine and terrestrial research results. If we are to understand the arctic system, responses of arctic plants to higher CO₂ and longer growing seasons may be related somehow to releases of trace gases, river-borne nutrients, and the pace of coastal erosion which will in turn may impact sea ice coverage, shelf productivity, and carbon balance. Yet marine scientists go to ocean science meetings, and describe how the Arctic Ocean is changing and "global" change in arctic tundra systems is published in journals that few oceanographers read. How can we achieve better examples of integration and synthesis across the land-sea boundary? Does a coastal, nearshore initiative accomplish this by definition, or do we need to take some special care to insure that any resulting research program will transcend the land-sea margin?

Post Title: Re: Welcome to the discussion (Lee Cooper)

Posted by: *Orson Smith* at 5:16 PM 1/30/2002

As this important discussion develops, I would like participants to be aware of an energetic group of specialists who are involved already through the Arctic Coastal Dynamics program. Details of this effort are available at <http://www.awi-potsdam.de/www-pot/geo/acd.html> An excerpt follows:

"...The overall objective of ACD is to improve our understanding of circum-Arctic Coastal Dynamics as a function of environmental forcing, coastal geology and cryology and morphodynamic behavior. In particular, we propose to:

- * establish the rates and magnitudes of erosion and accumulation of Arctic coasts;
- * develop a network of long-term monitoring sites including local community-based observational sites;
- * identify and undertake focused research on critical processes;
- * estimate the amount of sediments and organic carbon derived from coastal erosion;
- * refine and apply an Arctic coastal classification (includes ground-ice, permafrost, geology etc.) in digital form (GIS format);
- * extract and utilize existing information on relevant environmental forcing parameters (e.g. wind speed, sea level, fetch, sea ice etc.);
- * produce a series of thematic and derived maps (e.g. coastal classification, ground-ice, sensitivity etc.);

- * develop empirical models to assess the sensitivity of Arctic coasts to environmental variability and human impacts...."

Arctic Coastal Dynamics program meetings to date have evolved a detailed list of worthy measurements, analyses, and technology transfer efforts for assessment of Arctic coastal changes related to climate trends. Individuals and groups are seeking funding to accomplish these goals in their own areas of the Arctic coast. Such a well-considered program as the ACD deserves the attention of NSF and other funding agencies.

Orson Smith, University of Alaska Anchorage

Post Title: Re: Welcome to the discussion (Orson Smith)

Posted by: *Steve Zeeman* at 7:16 PM 1/30/2002

Orson, I took a quick look at the ACD site. I was wondering if this group had tried to tackle the issue of involving local people in the research efforts?

Post Title: Re: Welcome to the discussion (Steve Zeeman)

Posted by: *Ken Dunton* at 8:08 PM 1/30/2002

Researchers that work on land are a key component of this initiative because biogeochemical processes in the nearshore coastal area are largely driven by the timing and duration of carbon and nitrogen loading. To my knowledge, there is very little information published on the relationship and timing of nitrogen loading rates for low and high freshwater inflows. Land based researchers working in coastal watersheds, working in partnership with estuarine scientists can contribute significantly to our understanding of the factors that drive the timing and extent of nearshore primary productivity events. In the Beaufort Sea, nearshore productivity is probably extremely dependent on "new" nitrogen from terrestrial sources. I presume LAll investigators are aware of this important question which is best addressed as a collaborative effort.

Post Title: Re: Welcome to the discussion (Steve Zeeman)

Posted by: *Orson Smith* at 9:48 PM 1/30/2002

Steve,

ACD is an international group and the focus on local resident involvement varies, from what I know. You could contact the director, Volker Rachold, through his website link to find out more.

We have the beginnings of an Arctic Coastal Dynamics site for special focus at Elson Lagoon in Barrow. I've worked with Jerry Brown there, who has used support of the Barrow Arctic Science Consortium. I am preparing another proposal for work at that site which will involve Barrow people in data collection, perhaps high school students, beyond those employed by BASC.

I do this through other efforts, not just ACD-related projects. Our UAA School of Engineering has a successful industry-funded Alaska Native Student Engineer Program that involves native students in all of our programs.

I'm all in favor of involving local residents and have always done so. Local knowledge always helps with logistics and often with data interpretation. I don't think it should be like a tax, however. Paid local involvement isn't always affordable on small projects. Making room for volunteer assistance is easy. As a practical minimum, investigators should make a significant

effort to inform local interests of their work. In Alaska, there is usually some public forum for this, even in the smallest of villages.

Orson Smith

Post Title: Re: Welcome to the discussion (Orson Smith)

Posted by: *Steve Zeeman* at 11:20 PM 1/30/2002

Orson,

That is great. I concur that we as scientists should seek to involve the local communities in whatever ways possible. Your example should be followed by more of the science community. It always takes a little effort, but in the long run that effort more than pays for itself.

Organizationally, BASC is a nifty model for how the local community has made its own outreach toward the scientists. I wonder if other communities could do the similar things, or if Barrow is unique because of its location? I hear there is something like BASC in Chukotka, perhaps a little younger in its development. NSF could play a role in introducing new Arctic researchers to these organizations, and perhaps in developing more of them.

Post Title: Re: Welcome to the discussion (Orson Smith)

Posted by: *ajensen* at 1:15 AM 1/31/2002

Orson is right that local knowledge can help with logistics and data interpretation, but I'd take it a step farther. It can be invaluable in research design to talk to people who really know an area before making field plans. As an example, if one wants to study a particular species of fish, one needs to catch them. People with local experience will be able to tell what lakes to fish, when, with what color and mesh size nets, and where to set them, etc., etc.. Without that information, a researcher can burn a lot of field time and helicopter hours and wind up with a sample so small that it is useless. The pre-field investment of time and money can really pay off.

While people don't like the concept of local involvement being required, like a tax, there are a couple of points to consider. In some areas (parts of the Canadian North, for example) local assistants may be required as conditions of research permits. The "Principles for the Conduct of Research in the Arctic" (www.nsf.gov/od/opp/arctic/conduct.htm) pretty much indicate that some real local involvement is required as a matter of professional responsibility.

I fully appreciate the problems of incorporating paid local assistants in projects, having working in an area where the effective minimum wage for unskilled help is better than \$15/hr, in a discipline with typically low funding levels. However, there are ways to be creative even on small projects. Some items can be bought in villages (cost more/less shipping), one can hire a boat or rent a snowmachine, rent sleeping space in a community center, donate unused supplies (canned goods, pilot bread, etc.) to the local seniors or a church group at the end of field work, etc.

Volunteers are great. Again, if local folks have had some input into the project and are interested in the answers to the questions being asked, volunteers are more likely. Otherwise, volunteering will need to be fit into subsistence and work schedules. Researchers should be considerate when asking for volunteer help, and not ask for things that cost a lot of time or money. Many people don't really like to say no.

Post Title: Re: Welcome to the discussion (Steve Zeeman)

Posted by: *ajensen* at 2:25 AM 1/31/2002

Steve was wondering if Barrow was unique because of location. I don't think so, but the history is fairly unique and that may be a big part of the difference. Barrow had the Naval Arctic Research Laboratory (NARL) for nearly 40 years. A couple of generations of local people worked there, assisting and supporting scientific research. Many of those people became important community leaders, including North Slope Borough mayors, City of Barrow mayors, and Native Corporation executives. NARL had a major influence on modern life on the North Slope, from work rules to Prudhoe Bay. People here have generally had positive experiences with science. The system of resident science directors at NARL meant that they, and thus perforce the more transient researchers learned to pay attention to local peoples's knowledge, and came to acknowledge that in many cases it was more complete than that of Western science. When the Navy closed NARL, the local ANCSA corporation, Ukpogvik Inupiat Corporation (UIC--my employer) fought to keep the site functioning and intact, and eventually won the battle to exchange some of their land for the NARL facility. Part of the reason was that the leaders wanted the youth to have the same opportunities to work with science and scientists that they did. The North Slope Borough Department of Wildlife Management did and does a lot of research on whales out of the UIC-NARL facility. That research demonstrated that local knowledge was more correct than Western Science when it came to the BCB stock of bowheads, and saved whaling in front of the IWC. UIC now has a Science Division. A number of North Slope people work in science in various capacities. People here have experienced science as a positive force in their society as well as an economic engine. This is probably less true in many other places.

The Chukotka Science Support Group (CSSG) grew out of a long-term bowhead research cooperative effort between the North Slope Borough Department of Wildlife Management and Chukotka Natives, primarily from Ypik Eskimo Society of Chukotka and the Naukan Production Coop. This effort involved a great deal of capacity-building in terms of budgets, accounting, project reporting and so forth, which is necessary to function in the funded science mode on a continuing basis. Dr. Tom Albert, recently retired Senior Scientist for NSB Wildlife Management, did years of diligent and amazing work on this. The North Slope Borough was also very active in technology transfer to Chukotkans who were being forced to revert to a subsistence economy without the equipment or trained hunters (at least younger ones) to do so. A number of these Chukotkans were familiar with BASC, and BASC was being asked about supporting science in Chukotka, and thus was born the CSSG, along the BASC model of local involvement, knowledge and support. CSSG was really only supposed to be organizing itself last field season, but wound up actually supporting some projects, and all worked out.

Post Title: Re: Welcome to the discussion (ajensen)

Posted by: *Steve Zeeman* at 3:42 AM 1/31/2002

Anne,

That is a very informative summation of BASC and CSSG. You touched on what I was getting at, that Barrow has seen a lot of exposure to science and scientists. So they may be receptive to continued engagement in the process. But how about other communities that might have been more sheltered from such dealings.

The folks at BASC and CSSG might also be helpful in establishing links between the shore-based scientists and the ocean-bound variety. (Perhaps with a little funding from NSF for a workshop or two.) If the nearshore initiative is to be productive, I see that people not traditionally

used to working with each other, will have to do so. It is also realistic to expect that the local people might generate possible hypotheses that come out of traditional knowledge.

Post Title: Re: Welcome to the discussion (Steve Zeeman)

Posted by: *Ken Dunton* at 8:25 AM 1/31/2002

Anne, Orson, and others:

As has been the case for over three decades now, the focus for "arctic" research continues to be centered from Barrow westward into the Chukchi Sea with little attention given to the eastern Beaufort Sea coast. While I applaud any new efforts for studies which partner local knowledge and native expertise with science researchers, I am disappointed that communities to the east have been largely ignored. I have worked on the central and eastern Beaufort coast since 1977, and in particular I have interacted with extremely knowledgeable natives from Kaktovik on numerous occasions. Elson Lagoon has been studied frequently since the OCSEAP days, but how many times have you heard of work being conducted in or around Barter Island, Nuvagapuk Lagoon, or Demarcation Bay? The nearshore eastern Beaufort Sea shelf is known as an important feeding ground for marine mammals, birds, and fish. Higher productivity near Barter Island may be related to seasonal upwelling events. Local knowledge of this area remains largely untapped by scientists, yet this area will experience the greatest change if ANWR is opened to oil and gas exploration and development. Comments on this geographic disparity?

Post Title: Re: Welcome to the discussion (Ken Dunton)

Posted by: *Jerry Brown* at 4:08 PM 1/31/2002

Steve: I posted the [ACD community based approach under one the other topic](#). We were ready to go in 2000 with a North Slope community program but no funding! About your question concerning land and near shore interaction, of course we need folks working across boundaries. The coastal dynamics initiative (ACD) was and is intended to bridge that gap. Hopefully we can transfer some of it to this planning effort and vice versa (including pan arctic hydrology). Where do all the river sediments go?

Ann: I am reading along, but no time to comment. We are on the same wavelengths.

Jerry

Post Title: Re: Welcome to the discussion (Jerry Brown)

Posted by: *Ken Dunton* at 5:18 PM 1/31/2002

Hi Jerry,

Good question concerning the fate of all those river sediments. There are enormous amounts of sediments that are transported by the Sag river, east of Prudhoe into Stefansson Sound. The paradox is that much of Stefansson Sound is considered a non-depositional environment (ie. an erosional surface). If it were an area of sediment deposition, the extensive kelp beds in that area would be long buried. For this reason Erk Reimnitz and others from the USGS spent a considerable amount of effort looking into the role of ice as a transport agent for nearshore sediments.

Post Title: Re: Welcome to the discussion (Ken Dunton)

Posted by: *ajensen* at 7:13 PM 1/31/2002

Ken,

I'm really not sure that there is such a great disparity between the Beaufort coast and elsewhere (or at least not in the direction you suggest). There has been and is a lot of work on the Beaufort coast, probably more than on the Chukchi side. OCSEAP certainly reached all the way to Demarcation Point with studies. A lot of work has been carried out due to the oil development in and around Prudhoe Bay (including North Star and the proposed Liberty project). NSB Wildlife has done a lot of work on that coast. ADF&G has been quite active there. Looking at MMS's Alaska Annual Studies Plan: FY 2003, the Beaufort coast and nearshore are being looked at very intensely. I know of several current projects looking at various aspects of subsistence and subsistence resource species at & near Cross Island and Kaktovik, and additional proposed projects. Looking at a map put out by NOAA showing environmentally sensitive areas on the North Slope (which only covers Barrow to Demarcation Point and up the Colville) the majority of marks on the map fall between Uuliktuq/Oliktok and Jago Entrance. This probably isn't because the Prudhoe Bay area is wildlife heaven, but rather because it's been heavily studied. A lot of investigators working in Barrow have also worked in Prudhoe, since it provides a good logistical base (and the possibility of funding from oil companies). Some of the results may be buried in grey literature. Certainly there has been far more emphasis on the mid-Beaufort coast as opposed to elsewhere on the North Slope in traditional land use studies by various agencies. There have been archaeological surveys, but not much excavation, since the much higher erosion rate on the Beaufort has already removed most of the sites (especially the older ones). Norm Chance has done ethnography in Kaktovik, and a number of people have done TK studies there.

Your mention of ANWR is a little ironic. It isn't open yet. Only the 1002 area would be subject to petroleum activities. We are into the second winter of exploratory drilling in the NE part of NPR-A, which has three villages in it, one more (Nuiqsut) just over the eastern boundary, and yet two others (Point Lay/Kali and Anaqtuvuk Pass) dependent in part on resources which depend on NPR-A to survive. Yet that area is less well studied than the Beaufort coast. Additional leasing westward into NPR-A is planned.

Post Title: Re: Welcome to the discussion (ajensen)

Posted by: *Ken Dunton* at 2:44 PM 2/1/2002

Anne,

Your review of post-OCSEAP work is extremely valuable, namely because so much of the recent work that is conducted on the Beaufort Sea coast does not get published in the gray literature. This doesn't mean it's not good science; on the contrary much of it is excellent and represents a significant contribution to our current knowledge. The problem is that enormous amounts of this data can be lost over time, simply because few people are aware of the work, and after a decade or more, many if not all the people working on the project have moved on. Certainly, one of the major goals of our coastal initiatives should be to locate this information and compile it all in one location or electronic database before it is lost. Although I am familiar with some of the studies you mention, I know of many more that are being conducted by consultants for industry. I'm only aware of these because I meet these people while working

from Prudhoe or from remote islands on the coast. Unfortunately the written reports have very limited distribution.

Yes, I realize that ANWR is not open, yet. But you didn't specifically mention partnerships between scientists and natives at Kaktovik or other areas to the east. Have there been many to your knowledge?

Thanks again for your very valuable input!

Ken Dunton
Marine Science Institute
UT-Austin

Post Title: Re: Welcome to the discussion (Ken Dunton)

Posted by: *ajensen* at 6:43 PM 2/1/2002

I'm not as familiar with the situation in the Yukon and NW Territories, but it is my impression that local involvement does take place there. In Alaska, there really isn't any settlement east of Kaktovik.

Certainly the NSB Wildlife department works closely with the people in Kaktovik on various projects. There is at least one oceanography project in the planning stages which will involve people from Kaktovik on a long-term basis if it is funded. MMS is funding a bowhead feeding study which has a TK component and involvement of people from Kaktovik, and a study of impacts of OCS activities on bowhead hunting & subsistence activities in the Beaufort, for which Kaktovik is one of the communities involved. Nonetheless, I'm sure that there is work going on there which hasn't involved local people, a situation which can be improved upon to the benefit of all.

Post Title: Re: Welcome to the discussion (Lee Cooper)

Posted by: *HEicken* at 10:12 PM 2/1/2002

One aspect of the question that was asked here (how to connect land and ocean researchers) is that within the marine science community a lot of connection occurs through joint field trips. Sharing the same tent, bunk, vessel for a period is an excellent way to bring together people from lots of disciplines (provided the food is good...) and I've personally probably learned more about areas outside my main interest (well, maybe also inside) over lunch on a ship or while walking back from a field site on an ice camp.

Presumably, the same can be said about the terrestrial research community.

Hence, I wonder whether joint fieldwork or for starters some kind of joint field trips (with a research component) might help to get the exchange going. Given our tight schedules and other constraints, we may need more of this kind of nitty-gritty down-to-tundra or down-to-ice/ocean exchange rather than spending time in posh or not-so posh hotels/resorts/conference venues talking from very different perspectives, if not sides of the fence.

Post Title: Re: Welcome to the discussion (HEicken)

Posted by: *Steve Zeeman* at 12:49 AM 2/2/2002

That is a good point about the field trips. Maybe we could extend that even further and have joint planning trips to a field site, rather than meeting in Seattle or some other similar venue.

What do we need to do to insure that local residents of the Arctic coastal zone place value on having scientists conduct research in and near their communities?

ARCSS Planning Discussion > What do we need to do to insure that local residents of the Arctic coastal zone > Start here

Post Title: Start here

Posted by: *admin* at 7:24 PM 1/29/2002

What do we need to do to insure that local residents of the Arctic coastal zone place value on having scientists conduct research in and near their communities?

Post Title: Welcome to discussion

Posted by: *Lee Cooper* at 7:53 AM 1/30/2002

First, thank you for taking the time to register and to consider contributing to this Arctic Research Consortium of the United States (ARCUS) forum for scientific research planning on nearshore research in the Arctic. Some additional information on the Nearshore Initiative is available at the website for the Russian American Initiative for Shelf Land Environments in the Arctic (RAISE) website, <http://www.raise.uaf.edu> The point of this forum is to incorporate information from scientists, arctic residents, agency representatives, and others with an interest in the scope and direction of research in the Arctic coastal zone. Although some of the most relevant information about the need for coastal zone scientific research in the Arctic is being developed and posted on the RAISE website, our efforts here are not limited by geography or research program. Information and views posted here will be incorporated into program planning at the National Science Foundation's Arctic System Science Program (ARCSS) meeting planned for Seattle, Washington, U.S.A. for February, 2002.

The questions posed on the main page for this on-line forum are meant to stimulate discussion. As moderators, we welcome comments and information on any aspect of this research challenge.

Why did we pick the questions we did?

Here's a short synopsis for this question

Many U.S. scientific researchers enjoy working in the Arctic because of the opportunity afforded to experience a portion of the United States that is fundamentally different from mass American culture and retains an authenticity that is grounded in distinct, long-lived, and still surviving cultures. Residents of arctic coastal communities often come into contact with scientists, some of whom are also representatives of distant state and federal government agencies, but the exchange of information is often poor. How can we make interactions between local residents and visiting scientists mutually beneficial? What do we need to more effectively help each other? Many Arctic communities are wary of outsiders, and many scientists are also wary of entanglements in local communities that do not directly contribute to their perception of their research responsibilities. Yet any research effort in the Arctic Nearshore is going to involve

interactions between scientists and local residents. What can we do to make this effort as effective as possible?

ARCSS Planning Discussion > What do we need to do to insure that local residents of the Arctic coastal zone > resident community involvement

Post Title: resident community involvement

Posted by: *Jerry Brown* at 5:21 PM 1/30/2002

Folks: again as background and partially in response to the moderators questions related to community involvement, the following are resident based comments of the November 1999 Arctic Coastal Dynamics Workshop. They should be generally applicable. The North Slope HARC climate project (Amada Lynch) is addressing some of these issues, but not the actual observations.

Jerry

Community-based Coastal Monitoring Program

ACD Workshop Participants: Douglas Anderson (rapporteur), Caroline P. Cannon (Mayor, Pt. Hope), Julie Esdale, Anna Klene, Mae R. Hank (Pt. Hope), Benny Lane (Pt. Hope student), Loren Litchard (Barrow student), Owen Mason, Sue Mitchell, Vladimir Pitulko.

Introduction

Participation of Arctic residents in the planning and conduct of research in the Arctic is part of arctic policy. For that reason the U.S.-sponsored workshop invited both senior-level officials and students from the U.S. Arctic to participate in the workshop. The group specifically recommended that a community-based monitoring protocol be included in the general coastal dynamic research and monitoring design.

The community-level group considered ways by which studies of coastal processes can assist Arctic coastal villages to recognize and deal with the environmental hazards that confront them. A key to our approach was to examine ways in which the long-term expertise of local residents can be brought to bear on both the data collection and the monitoring of coastal processes in and around the villages. The particular advantages of a community focus are that the monitoring can be continuous throughout the year and from year to year, achieved at a fraction of the cost of external scientific programs, bring to light relevant additional environmental variables that may not have been considered in prior research designs, and formulated in ways that directly influence local decisions to mitigate the hazards.

We have organized our comments around criteria to consider for a successful monitoring program, general procedural issues, and specific suggestions for conducting the program.

5.6.2 Criteria

The monitoring program must be set up in such a way as to insure consistency in data collection, continuity in monitoring, and also that the data collected are cumulative and ready for widespread dissemination. There should be a procedure by which local investigators can readily contact by internet specialists to answer questions.

A single set of criteria for monitoring the coastal processes should be established with the needs of both the local community and the scientific community addressed. The data collection procedures must be community based, with the training targeted to the long-term local residents.

The training and instrumentation must be appropriate to village level capabilities. Particular care must be taken to insure long-term monitoring and data collection. Programs such as GLOBE can be used by students to enter and exchange observations data and information.

5.6.3 Procedures

A long-term goal is to develop a pan-Arctic list of coastal threats. This could start out within particular regions, but eventually should be expanded to encompass the entire circum-Arctic region.

Following on the above, the second step is to assemble representatives from the particular regions to develop a general priority list of relevant coastal hazards and threats to local natural and cultural resources. Then, together with the scientists use this list as a basis for establishing the relevant variables to monitor. In northwest Alaska, these pertain primarily to erosional factors. In other areas, such as river deltas, etc., depositional factors may be especially important.

5.6.4 Community-level site selection

This program should be inclusive in nature, such that all interested communities are welcomed. Some communities, particularly those in under-represented regions and geomorphic situations might be encouraged or lobbied to join. Initially, we suggest an opportunistic site selection approach, targeting 2 or 3 communities in which we have particular knowledge and/or representation. Point Hope and Barrow are logical sites for the initial stage. Other procedures are to solicit interest in the program from other Arctic communities, something that can be done inexpensively by radio or other media. The interested communities could form a pool from which Key Sites could be selected. The number and placements of monitoring stations should be selected with a view toward the scale of the problem and the complexity of the coastline.

The program might be able to make use of high school students for data collection. The students would benefit both by learning scientific methodology and by enhancing their credentials on their college applications. One drawback to using students is a potential lack of continuity, since many of the village teachers remain in a particular village for only 2 or 3 years. To rectify this, in all cases a long-term local resident ought to be the "point person" for data collection and monitoring. It would be advantageous for everyone involved if that person could train both the new teachers and students in the monitoring program and oversee the results.

5.6.5 Implementation

The first step to implement the program is the development of a handbook of procedures to be distributed to participant communities. One option is to use the handbook developed by the Geological Survey of Canada (in preparation), modified for a general audience. The handbook should include a description of procedures such as to keep a laboratory log/field book, standardized measurement techniques (using the metric system), recommend spatial intervals to use in establishing monitoring stations, what temporal intervals to collect data (regular intervals plus a particular events like storms), and possibly procedures for entering data into the computers (and possibly into web sites such as the maintained by GLOBE), etc. In addition to the quantitative data, it would be important to include a qualitative monitoring data collection

procedure, which could include describing the results of specific storms, storm surges, etc. Also of interest would be videotape of particular events

School children

ARCSS Planning Discussion > How can we get school children living in arctic coastal communities interested > Start Here

Post Title: Start Here

Posted by: *admin* at 7:21 PM 1/29/2002

How can we get school children living in arctic coastal communities interested in the challenges of environmental change within their local communities?

Post Title: Re: Start Here (admin)

Posted by: *Steve Zeeman* at 12:25 AM 1/30/2002

There are some good models out there for getting school children involved in research like GLOBE <http://www.globe.gov/>. Is this an applicable model for the children in the region? Are there other, more applicable models out there?

Post Title: Re: Welcome to discussion

Posted by: *Lee Cooper* at 7:50 AM 1/30/2002

First, thank you for taking the time to register and to consider contributing to this Arctic Research Consortium of the United States (ARCUS) forum for scientific research planning on nearshore research in the Arctic. Some additional information on the Nearshore Initiative is available at the website for the Russian American Initiative for Shelf Land Environments in the Arctic (RAISE) website, <http://www.raise.uaf.edu> The point of this forum is to incorporate information from scientists, arctic residents, agency representatives, and others with an interest in the scope and direction of research in the Arctic coastal zone. Although some of the most relevant information about the need for coastal zone scientific research in the Arctic is being developed and posted on the RAISE website, our efforts here are not limited by geography or research program. Information and views posted here will be incorporated into program planning at the National Science Foundation's Arctic System Science Program (ARCSS) meeting planned for Seattle, Washington, U.S.A. for February, 2002.

The questions posed on the main page for this on-line forum are meant to stimulate discussion. As moderators, we welcome comments and information on any aspect of this research challenge.

Why did we pick the questions we did?

Here's a short synopsis for this question:

Children who live in arctic communities have an enormous stake in Arctic environmental change. The communities they live in may be changed beyond recognition by environmental change, in addition to economic, social and political stresses. Challenges in the future are likely to surpass those of today. Understanding the potential changes, and adapting to it in advance

will be key advantages. Scientific knowledge that is gained by research in and near Arctic communities hopefully can contribute to that adaptation, but children in most arctic communities have few role models for research scientists or other highly educated professionals. They do not generally see the point of becoming highly educated (except perhaps in a traditional knowledge sense). If becoming knowledgeable about Arctic environmental change from a Western scientific viewpoint is an advantage, and if it is even more of an advantage to be a local Arctic resident with traditional knowledge of the Arctic system, how do we get school-age children to appreciate the positive force they can play in the future of their communities by involving them and ourselves in exchange of information while we conduct research in and near their coastal communities?

Post Title: Re: Start Here (Steve Zeeman)

Posted by: *jwarburton* at 10:26 PM 1/30/2002

There are lots of great models about getting students involved in their community. Most applicable models are derived from environmental education programs. EE programs try to be holistic by bringing community issues, viewpoints into the program and are usually cross discipline. The Globe program is a good model for incorporating data from around the world and getting students to work with the data however it has some drawbacks like most programs.

I'd be happy to draft a list of model programs and/or something about what a model program might look like. For future reference, ARCUS is putting together an interactive website and conducting a virtual field trip in April about the geosciences. Our goal is to bring Arctic research to the classroom and provide teachers with a tool for teaching technology and science.

Post Title: Re: Start Here (*jwarburton*)

Posted by: *Steve Zeeman* at 11:03 PM 1/30/2002

Thats exactly the kind of feedback that we are looking for. Things that have worked for folks and things that have not. This issue is a critical one and deserves some real clear thinking. I believe that the population, indigenous people around the Arctic, are quite a bit different in some ways than those that GLOBE (for a large part) has been addressing. These differences may have a large bearing on how we as scientists encourage their collaboration. If you could sketch out a possible model, that would help the discussion.

Post Title: Re: Models (Steve Zeeman)

Posted by: *jwarburton* at 1:09 AM 1/31/2002

Below are two links to community science based education projects. Both of these are examples of Alaskan projects that have been successful. Unlike the Globe project, these projects are very specific and focus on a community issue. I believe that is what makes them so successful. They all started with a community concern and then worked outward. They also tie in the school and the experts to make it a complete program. You will see in the Noyes Slough Project that the students are involved in the project at all levels. Another program that is in Alaska, called Rural Cap, is also successful in making environmental changes at the community level. This program is run by a non-profit and uses local liaisons to (1) find and define the community issue, (2) strategize a community plan of action, (3) put the plan into action.

Noyes Slough Project <http://www.northstar.k12.ak.us/schools/awe/noyes/noyesmain.html>

4-H Fisheries Education, Natural Resources, and Youth Development Program
<http://www.uaf.edu/coop-ext/4h/fish.html>

I think the challenge for researchers is not so much trying to create these types of programs but rather how to "tap" into them. For instance, how does one know what is going on in any particular village or area? If your research is in the summer, how can a school be part of the process? Who should a researcher approach in the community or the school about what they are doing? How can the researcher be most effective in conveying what they are researching to the general public? Etc...., Etc....

Post Title: Re: Models (jwarburton)
Posted by: *Steve Zeeman* at 3:19 AM 1/31/2002

 The questions Warburton raises at the end are salient, especially for researchers new to the region. I wonder if anyone keeps a database of such activities? In some areas one can send messages (email or snail mail) to principals of schools and establish links that way. Are there other methods of contacting potentially interested parties? Are there accepted protocols or channels, or does this vary from village to village? How about on foreign soil?

It sounds like two good points of contact might be the Noyes Slough Project and Rural Cap. Also, in another question (How will the Nearshore Initiative connect with researchers who primarily work on land?), Anne Jensen provides some insight into two other groups (BASC and CSSG) that have forged links between the native residents and scientists. I suspect that all these groups might be good points of contact for the areas that they serve. Are there regions that are not served by these groups, but might be of interest to the scientists? If so, how can we best initiate relationships?

In the Rural Cap scheme mentioned by Warburton, it is a "bottom-up" process starting with a community issue. What if the process is "top-down" with the question coming from the science group? Is there sufficient time to build the community respect and linkages between the initial notification of funding and start-up of the project?

Post Title: Re: Models (Steve Zeeman)
Posted by: *ajensen* at 5:34 AM 1/31/2002

 I'm not aware of a database of such activities, although one would be useful. The upkeep would be the problem, of course.

One can contact schools, and that is a way to begin interaction with the school. However, staff turnover, even at the principal level, can be high in rural schools, so a contact made one year may not mean much the next. In a significant number of cases, the staff is not from the community and may not be that tied in to the community, so school-only contacts can be insufficient.

In Alaska, villages can have several types of overlapping groups. There may be a municipal government ("city" chartered under the State of Alaska), an Indian Reorganization Act government (IRA or Traditional Council, Native Village of wherever), an Elders' Council, a village Alaska Native Claims Settlement Act (ANCSA) corporation, and perhaps an associated non-profit. In some cases, the same people may wear many hats. At a higher level, some villages are within a borough (Alaska's county-level municipal government) and some aren't. There may also be a regional ANCSA corp. and perhaps one or more associated non-profits,

and perhaps a regional tribal government. Land ownership may be federal (BLM, US F&WS, etc.), state, regional corporation, village corporation, native allotment, townsite, or a couple of other possibilities. Zoning may apply.

If you are going to work in or near a village, in the first go-round you should try to contact all possible entities. It is good to make phone calls to confirm addresses, and find out who is occupying relevant positions, but then you need to follow up with plain-language letters. After that, face-to-face contact is really advisable, at a time convenient to the village. No point spending the money to get somewhere during moose season if everyone in town is out of town catching moose. The holidays and AFN meeting time and Permanent Fund Dividend time aren't great either, since people often travel then. The State of Alaska web site has information on most communities, and there are Alaska Bush Phone books which can be really helpful. If you get someone on the phone they will often be extremely helpful as well. This meeting will give people a chance to get to know the researchers, and perhaps help shape the project in a way beneficial to both researchers and residents. If so, they will be much more interested and helpful. Once a relationship is established, it may become clear that only certain organizations have an active interest, although it is always a good idea to keep everyone informed by letter. In over half of the villages in Alaska, Internet access is very limited or non-existent, except for perhaps at the school. In many cases, dial-up numbers are long distance, so don't send monster attachments.

As far as time to build the community respect, the time must be found. SGERs may be one avenue for this. Planning grants can be available for some things. In some cases, the answer is to buy a plane ticket and go before submitting the proposal. "Hit-and-run science" with researchers arriving as if parachuted behind enemy lines has never made friends for science in general, and since people know that researchers can do it better (since many do) they are less likely to accept it. Actions in the field today can have effects on colleagues' ability to do research decades from now. One long-deceased (and not universally lauded while alive) prominent physical anthropologist behaved so badly in practically all corners of Alaska that there are still places where "anthropologist" or "archaeologist" can be a really dirty word. People have worked in some of those places, but it took a lot of trust-building first.

Post Title: Re: Models (ajensen)

Posted by: *Henry Huntington* at 6:50 PM 1/31/2002

Anne's description of what needs to be done--and what the obstacles are--is a good one. Unfortunately, there are no universal solutions, not are there recognized central points of contact for most of the state. In other countries, there are sometimes central bodies, but as with Alaska, they may not necessarily be respected by the communities they claim to serve. This can be a big problem, where one organization sets itself up as the point of contact. Researchers may work with that organization, only to discover when they get to the village that the villagers don't know about the organization or don't regard it as having any relevance to their work with scientists. In other words, you need to make contact at the community level, or be very sure that the organization you're has credibility with the locals. When I worked for Inuit Circumpolar Conference, I thought that would give me some cachet in the villages, but I soon found that I had to explain what ICC was. The key, I think, is having the time to establish relationships and have enough continuity to the project that you can follow up on things, and not have the project end just as you are figuring out how to work effectively with the village(s) in question.

Post Title: Re: Models (ajensen)

Posted by: jwarburton at 7:27 PM 1/31/2002

Great discussion! I have a lot to add - please bear with me

The approach that Anne Jensen suggests on working with communities is right on! As for a database, there isn't really one - but I've had previous discussions with Josh Klauder, who is working on the ALIAS web site, about this very thing. Since the ALIAS web site focuses on logistics by community, I think he can add an element about "who" to contact for public outreach opportunities in that particular community. We'll see what ARCUS can do.....

As I was mulling over this discussion last night, I think the question for the forum is really not, "How to get the students involved in arctic research?" but rather "How can researchers get community buy in?" Student participation then becomes just one element of the "how" to make this happen.

As Anne already pointed out, people can't just blow into a community, do what they want, and then leave. Communication is the key. So, how do you get community buy-in? As Steve pointed out, sometimes things come from the top down and not necessarily start at the community level. So what do you do?

The answer is to make it locally relevant.

Let's use the Noyes Slough restoration project as an example. In our scenario, a researcher comes to Fairbanks and is studying climate change in the Interior but needs community support to get the point across that this an important issue to us all.

The researcher approaches the Noyes Slough Committee and talks about climate change. The implications of climate change can already be seen in the Fairbanks area - less snow in the winter means less runoff in the streams and the sloughs. Spring runoff is an excellent cleanser of an area - pushing out debris and oxygenating the water, particularly for sloughs. Another change in the Fairbanks climate is during the summer. The rainy season seems to come earlier, starting in July instead of August. This makes the rivers and sloughs flood. Instead of replenishing the slough, there is a flood in the middle of summer causing erosion and all the bank vegetation goes with it. So, if you are on the Noyes Slough restoration project and one of your projects is to prevent bank erosion and restore habitat - this is not good! You suddenly become concerned about climate change!

So, lets bring in the students. The researcher and now committee decided to involve the students at Anne Wein School and learn about climate change. The researcher sets up a mechanism for students to measure snow, weather, and other parameters on Noyes Slough through out the school year. Perhaps they set up a gauging station on the slough to measure runoff. Data is collected and integrated into the projects they are already doing on Noyes Slough. The teacher takes it to the next level, by discussing that if this happens to Noyes Slough, what happens on the Chena? What happens on the Kenai? What happens to rivers associated with glaciers such as Knik? Is there anything we do that causes climate change? And, so forth. At this point, the researcher now has community buy-in because the kids go home and talk to parents. The teacher writes up articles about their project which goes to the community. The Noyes Slough committee promotes the research project. It becomes locally relevant.

Of course this is an ideal model....but these opportunities exist out there. Like Anne suggested, just talking to the community representatives visiting schools, etc... will go a long way in project promotion and research awareness. My last suggestion is not to tackle all the communities you work with - some places will be easier than others. Start where there is something you can work with such as a science teacher, receptive community leaders, a school program, or federal/state agency representative. In the end, you will be more successful and build on those successes.

Post Title: Re: Models for Science Education and Community Outreach (jwarburton)

Posted by: *Wendy Warnick* at 8:47 PM 1/31/2002

The idea of a database of contacts is a worthy one and it is also an enormous and perhaps impossible job for the Arctic. As both Henry Huntington and Anne Jensen point out, like many human resources, the appropriate contacts in arctic communities do change over time. The best contact may be an individual, it may be an organization, or it may be an official community or government entity. It is frequently difficult to discern the politics of a particular community from afar, especially the politics of small communities, and easy to make mistakes in identifying contacts. As Anne points out, it is a useful exercise on a number of levels for researchers to become as familiar as possible with the communities with which they will be or should be interacting and to develop relationships and build networks themselves rather than relying on some outside entity to do it for them. It is true that making those first connections can be very intimidating and sometimes impossible without actually going to that community and walking around. There are some organizations in each country or region that may be able to provide information or assistance: for example in Alaska, the Barrow Arctic Science Consortium (<http://www.sfos.uaf.edu/basc/>), the Alaska Native Science Commission (<http://www.nativescience.org/index.html>), the Alaska Native Knowledge Network (<http://www.ankn.uaf.edu/>). None of these contacts will provide researchers with everything they need to develop community networks and relationships but they are good places to start.

Post Title: Re: Models (jwarburton)

Posted by: *HEicken* at 9:58 PM 2/1/2002

Very interesting discussion. Based on my limited own experience working with an elementary school in Barrow (as part of a larger project, you can find more information at <http://www.arcticice.org>), here's a couple of items that I've learned to be important.

- Only after having visited the school a couple of times have I really gotten an appreciation of the various difficulties and challenges that teachers face on a daily basis (even if the school's overall financial support is sufficient and that may not even be the case everywhere). Being able to reasonably weave your way through an undergrad class and keeping 3rd graders' attention while actually teaching them something are two completely different things, and I'm not sure whether the common approaches to K-12 activities are always the best. Here, I'd like to see/read more from educators who really know about this (maybe GLOBE is a good venue for that). Also, it would help to have some kind of document that summarizes just what (and how) work with K-12 environments can be so interesting, rewarding and challenging. Otherwise, it's easy to just pop in once (as Anne was alluding to) and then be gone for good. In particular in Arctic coastal communities, where a lot of researchers show up for the summer, making a commitment to visit when it's cold and dark in of itself may bring across a different kind of earnesty and commitment.
- Based on what little experience I've gotten teaching an undergraduate class on snow and ice for non-science majors here in Fairbanks, I've found that while high school students may be more advanced in their course work and possibly appear as more "interesting" (for lack of a better word) partners within an outreach program, it may be much more important to reach

younger students to allow them to find out about and subsequently pursue potential interests in science as well as provide all of the students with an enhanced perspective (i.e., both traditional and non-traditional) knowledge of their environment.

Post Title: Re: Models (HEicken)

Posted by: *Steve Zeeman* at 12:57 AM 2/2/2002

I agree wholeheartedly, that the K-8 crowd is a vital part of the audience. In some ways they are both easier and more challenging to deal with. Leaving them out, in my estimation, is not an option.

One of the things that I see coming out of these discussions, is that perhaps the near-shore initiative (and others) need a dedicated outreach coordinator who can seek out the appropriate people and help set up the initial contacts between the scientists and the communities. A liaison person might help smooth the rough spots, be more aware of various outreach projects, and be more attuned to protocol than say a newbie to Arctic regions. Just a thought.

Post Title: Re: Models for Science Education and Community Outreach (Wendy Warnick)

Posted by: *Elena* at 2:32 AM 2/2/2002

This is the second year of our NSF funded project on Global Change Education Using Western Science and Native Observations, developing a model for engaging K-12 students in environmental research relevant to their communities. We are using the GLOBE program and some Alaska relevant climate change research for the western science and Native elders and other local experts for traditional knowledge and observations, and incorporating best science and math practices. The challenge is the blending of all these three strands. We have been training teachers during a two-week Summer Institute called "Observing Locally Connecting Globally" which starts with a field trip on the river with Athabaskan elders. We introduce and scaffold the GLOBE and climate change areas of investigation with traditional knowledge shared by Native elders/other local experts during the institute. We also model best math and science practices have the teachers integrate the three strands in an inquiry/research project during the institute. A Native environmental change observations/knowledge survey designed for students to use in interviewing elders/other community experts, was piloted in three schools participating in the Global Change Education program. This survey was developed by my co-investigator Sidney Stephens who is also working on a protocol that will be helpful in guiding students in investigating local environmental change starting with interviews of local sources, deciding on a research question and methods of collecting data, data analyses and sharing the information. We have encouraged teams of teachers/community members/environmental specialists to come to the summer institute and be part of the Global Change Education Program. GLOBE and other climate change research areas need data collection outside the regular school year. We need pre-college students and community involvement in our monitoring efforts of environmental change.

Listed below are some publications related to our project :

Stephens, S. (2000). "Observing Locally, Connecting Globally" in Sharing our Pathways (5) 6-7. Rural Systemic Initiative.

Sparrow, E.B., Stephens, S., and Gordon, L. (2000). "Global Change Education Using Western Science and Native Observations and Knowledge".

Abstract published in the proceedings of the 51st AAAS Arctic Science Conference. Whitehorse, Canada. September 21-24, 2000.

Gordon, L. (2001). "Breaking New Ground in Alaska: The Global Change

Education Using Native Knowledge and Western Science Program" In Eisenhower National Clearinghouse Focus New Horizons in Math and Science Vol 8 (4).
Sparrow, Elena. 2001. Innovative Ways of Integrating Global Change Education in K-12 Classrooms. *Agroborealis* 33(1):30-33.
Sparrow, Elena, 2001. GLOBE: A New Model in K-12 Science Education. *Global Glimpses* 9(1):1-4.
Sparrow, Elena, 2001. Pre-college Students Contributing to Long-Term Climate Studies. *Eos Transactions, American Geophysical Union*. 82 (47), Fall Meet. Suppl. Abstract GC32A-0224.

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ARCSS Planning Discussion > How can we get school children living in arctic coastal communities interested > involvement of school children

Post Title: involvement of school children
Posted by: *Cynthia Tynan* at 10:13 PM 2/1/2002

Many school children express an interest and concern for the status of the animal populations that they are familiar with. Creating direct web-based or on-line linkages between ongoing research on Arctic mammals and birds with classrooms is one way to share our Science with school children. Being able to direct questions to researchers while they are in the field provides perhaps the closest connection. To what extent is this being done in our Arctic programs at present?

Another idea is to encourage school children to become a part of long-term local monitoring and data collection. To the extent that school children can monitor the arrival and departure dates of mammal or bird populations in the Arctic can provide local ecological time series that are valuable for the interpretation of climate change effects. For example, as a child growing up in the northeast of the U.S., I would often note the date that robins arrived in spring and hummingbirds left in the fall. Time series of such observations are now becoming very valuable for gaging the possible impact of global warming on migratory trends and habitat use patterns. No doubt there are Arctic communities that already share their observations on shifts in the timing of arrival or departure of various animal populations. Involving schools in a directed and systematic way in the Arctic might facilitate the linkage between children and their changing environment, while helping the children to recognize that they are a part of the scientific process.

Cynthia Tynan