Northern Climate ExChange

Independent Information - Shared Understanding - Action on Climate Change

NCE Update August 17, 2011

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Announcements

1. Sharing the Land Scholarship
Deadline Wednesday August 31, 2011

The Yukon Fish & Wildlife Management Board is seeking applications for the Sharing the Land Scholarship - a $1000 scholarship to post-secondary students pursuing education that continues the connection between people and the land.

Eligibility criteria:
Applicant must be a Yukonresident pursuing post-secondary training in continuing the connection between people and the land
Documents required: Transcript; Acceptance letter; and a two-page essay outlining what significance the Yukon's wilderness holds for you and what you hope to do to continue sharing the land with fish and wildlife through your educational goals.

Apply to:
Send your essay, transcripts and a letter verifying your acceptance to a post-secondary institution to:
Sharing the Land Scholarship
c/o Yukon Fish and Wildlife Management Board
Box 31104, Whitehorse, YT Y1A 5P7

Info: 2nd Floor 106 Main Street

2. Refrigerator and freezer retirement program from the Energy Solutions Centre

The Energy, Mines and Resources, Energy Solutions Centre, in partnership with the Yukon Energy Corporation is launching a refrigerator retirement program with incentives for people to remove old inefficient refrigerators and freezers from the electrical grid.

Older refrigerators and freezers cost more to operate and generate a higher demand on the electrical grid. The program will pay $50 for every appliance that is decommissioned (up to two appliances) and will also cover the cost of transportation and landfill tipping fees for a total value of between $150 and $200 per household.

For full program details and applications forms visit www.emr.gov.yk.ca/energy or contact the Energy Solutions Centre at (867) 393-7063 or toll free from the communities 1-800-661-0408 ext 7063.

Articles

1. Arctic permafrost thaw will boost carbon emissions

By Emily Chung
CBC News
August 15, 2011

The Arctic will switch from being a carbon sink to a carbon source by the end of this century as the permafrost thaws and emits greenhouse gases, a new study suggests.

The UN's Intergovernmental Panel on Climate Change had predicted that land-based ecosystems in the Far North would store more carbon from the atmosphere as the climate gets warmer.

That's because more plants are expected to flourish in the North, taking in more carbon as they grow and as their growing season gets longer. Storing more carbon this way would turn the Arctic into a carbon "sink" and help mitigate climate change, as carbon dioxide is considered one of the main heat-trapping greenhouse gases.

But the UN panel based its prediction on models that didn't account for the effect of thawing permafrost.

That permanently frozen soil layer contains billions of tonnes of plant and animal matter that has remained trapped there for up to tens of thousands of years. The thawing of the permafrost could allow that material to decompose and release its carbon back into the atmosphere.

A new study, to be published this week in Proceedings of the National Academy of Sciences, used mathematical models to predict that the Arctic will release 62 billion tonnes (plus or minus seven billion tonnes) of carbon over the 21st century, roughly 620 megatonnes a year.

That is comparable to the amount of carbon emitted by Canada in 2009, reported by Environment Canada to be 690 megatonnes, roughly a 10th of total global human emissions.

"This is just a fraction of the amount of carbon that we emit as a species per year, but it's important," said Charles Koven, project scientist at Lawrence Berkeley Lab in Berkeley, Calif., and lead author of the study.

Most of the seven billion tonnes of CO2 emitted globally each year by the burning of fossil fuels currently gets absorbed by either the land or the ocean, he said. "The big question is whether that's going to continue."

If the Arctic stops taking in carbon emissions, more carbon will likely end up in the oceans - and the atmosphere.

Methane boost
In addition to the extra carbon, annual emissions of methane, another greenhouse gas, are expected to

double due to the increased breakdown of wetland plants, which are decomposed into methane by bacteria, the paper said.

Because tropical ecosystems are also expected to become a carbon source as the climate gets warmer, the findings suggest that climate change will leave "only the mid-latitudes as potential climate regulators."

The paper added: "We note as well that significant permafrost stocks exist and a steep loss continues at 2100, so that beyond the time horizon considered here there is still a potential for enormous carbon losses from high-latitude soils to continue."

There are an estimated 1,500 to 2,000 billion tonnes of carbon stored in Arctic permafrost.

The researchers predict that mean soil temperatures at high latitudes will increase by eight degrees Celsius by 2100 - far more than temperatures closer to the equator - and about 30 per cent of Arctic permafrost area will be lost.

About two-thirds of the predicted carbon loss due to Arctic warming is expected to come from permafrost and the other third from soils that freeze in the winter, then thaw in the summer.
"In some places, you can expect a complete loss of permafrost near the surface with climate warming," Koven said, adding that in others, the surface layer that melts in summer will simply thicken at the expense of the permafrost below.

Among Koven's collaborators for the study was Agriculture Canada researcher Charles Tarnocai, who provided "crucial" maps of soil carbon for the study, Koven said.

www.cbc.ca/news

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2. Arctic sea ice at the crossroads: National Snow and Ice Center

Nunatsiaq Online
August 16, 2011

After a period of slow melt from late July through early August, "Arctic ice extent is again declining at a brisk pace," but remains higher than for 2007, the record low year, the National Snow and Ice Center said Aug. 16.

Information gathered by its scientists and satellites show ice continues to thin.

With about a month left in the sea ice melt season, the amount of further ice loss will depend mostly on weather patterns, the Colorado-based NSIDC said.

As of Aug. 14, Arctic sea ice still covered 5.56 million square kilometres, 2.11 million square km less than the 1979 to 2000 average for that day, and 220,000 sq km more than the Arctic ice coverage on that day in 2007.

Sea ice is low across almost all of the Arctic, with the exception of some areas of the East Greenland Sea - just as the NSIDC said it was earlier this month.

The southern route of the Northwest Passage, now appears to be free of sea ice, but there may be up to 20 per cent ice concentration remaining in some parts of the passage, the NSIDC said.

www.nunatsiaqonline.ca

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3. On thin ice
The most recent global climate report fails to capture the reality of the changing Arctic seascape, according to MIT researchers.

By Emily Finn
MIT News Office
August 10, 2011

The Arctic - a mosaic of oceans, glaciers and the northernmost projections of several countries - is a place most of us will never see. We can imagine it, though, and our mental picture is dominated by one feature: ice.

Yet the Arctic sea ice is changing dramatically, and its presence shouldn't be taken for granted, even over the course of our lifetimes.

According to new research from MIT, the most recent global climate report fails to capture trends in Arctic sea-ice thinning and drift, and in some cases substantially underestimates these trends. The Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report, released in 2007, forecasts an ice-free Arctic summer by the year 2100, among other predictions. But Pierre Rampal, a postdoc in the Department of Earth, Atmosphere, and Planetary Sciences (EAPS), and colleagues say it may happen several decades earlier.

It's all in the mechanics
Established in 1988 by the United Nations, the IPCC issues reports that represent an average of many findings, and is sometimes criticized for forecasting according to the "lowest common denominator" of climate research. Still, many policymakers put large stock in its predictions, so Rampal says it is important to continuously evaluate and improve their accuracy.

After comparing IPCC models with actual data, Rampal and his collaborators concluded that the forecasts were significantly off: Arctic sea ice is thinning, on average, four times faster than the models say, and it's drifting twice as quickly.

The findings are forthcoming in the Journal of Geophysical Research - Oceans. Co-authors are Jérôme Weiss and Clotilde Dubois of France's Centre National de la Recherche Scientifique/Université Joseph Fourier and Centre National de Recherches Météorologiques, respectively, and Jean-Michel Campin, a research scientist in EAPS.

Part of the problem, Rampal says, may be inadequate modeling of mechanical forces acting on and within the ice in the Arctic basin. Thus far, the IPCC models have largely focused on temperature fluctuations, which are one way to lose or gain ice. But according to Rampal, mechanics can be just as important: Forces such as wind and ocean currents batter the ice, causing it to break up. Ice that's in small pieces behaves differently than ice in one large mass, which affects its overall volume and surface area.

"If you make a mistake at this level of the model, you can expect that you are missing something very important," Rampal says.

The seasonal tug of war
Rampal says mechanical forces can play a significant role in winter, when little melting occurs but when strong winds and ocean currents can wreak drastic effects on the ice's shape and movement.

Traditionally, in winter, most of the Arctic Ocean was covered with a thick sheet of ice. But today's winter ice cover is thinner, meaning it breaks up more easily under the influence of winds and currents. It eventually looks like an "ensemble of floes," Rampal says, instead of one large mass. In summer, natural melting due to warmer temperatures opens the door to even more breakup. (Scientists refer to these patches of floes as "pancake ice," because the small circular pieces look like - yes - pancakes on a griddle.)

During both seasons, ice in this state is prone to escaping from the Arctic basin, most commonly through the Fram Strait, a wide swath of ocean between Greenland and the Norwegian archipelago of Svalbard. The smaller the floes, the more likely they are to be lost through the Fram Strait, where they melt on contact with warmer waters to the south.

So, several factors are connected in a positive feedback loop: Thinner ice breaks more easily; smaller chunks of ice drift more quickly; and drifting ice is more prone to export and melting at lower latitude. But Rampal also cites examples of negative feedback loops, which may counteract some of the ice loss. For example, large cracks in winter's ice cover help create new ice, since the extremely cold air in contact with the liquid ocean promotes refreezing, which leads to a sheet with greater surface area than before.

'You'd better start now'
Because "everything is coupled" in these intricate feedback loops, "it's hard to predict the future of Arctic sea ice," Rampal says. Doing so will require more thorough modeling and real-world observations, especially of mechanical forces and other ice phenomena that have been poorly understood. Rampal is now working on a project with researchers at MIT and NASA's Jet Propulsion Laboratory, whose goal is to combine models and observations for a more accurate picture of the state of the world's oceans.

Bruno Tremblay, an associate professor in the Department of Atmospheric and Oceanic Sciences at McGill University, agrees that "the dynamic of sea ice is really important," and inadequate modeling of mechanical forces is "part of the reason [the IPCC report] can't predict correctly the future of sea ice decline." Still, he cautions against jumping to overly grim conclusions, citing a need to consider subtle changes in the Arctic atmosphere: At some point, for instance, "maybe the wind no longer aligns itself with the Fram Strait, and that reduces ice export," he says.

Although it's impossible to say for sure when we might see an ice-free Arctic, the IPCC itself has acknowledged that its 2007 report may have painted too rosy a picture. "If you look at the scientific knowledge things do seem to be getting progressively worse," said Rajendra Pachauri, IPCC chair, in an interview reported by The New York Times shortly after the report's release. "So you'd better start with the interventions even earlier. Now."

web.mit.edu

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4. Arctic cruise explores changing ocean

U.S. Geological Survey
August 16, 2011

Scientists from the U.S. Geological Survey will embark on a research cruise to the Arctic Ocean August 15 to collect water samples and other data to determine trends in ocean acidification from the least explored ocean in the world.

For the second straight year, the researchers will set sail aboard the U.S. Coast Guard vessel Healy. What they learn from the data collected during the seven-week cruise will provide an understanding of the extent Arctic Ocean chemistry is changing and detail potential implications for carbonate species - like phytoplankton and shellfish - that are vulnerable to greater ocean acidity.

Ocean acidification is the process by which pH levels of seawater decrease due to the greater amounts of carbon dioxide being absorbed by the oceans from the atmosphere. Currently oceans absorb about one-fourth of the greenhouse gas. Lower pH levels make water more acidic and lab studies have shown that more acidic waters decrease calcification rates in calcifying organisms, reducing their ability to build shells or skeletons. These changes, in species ranging from corals to shrimp, have the potential to impact species up and down the food chain.

"The Arctic Ocean is one of the most vulnerable areas for ocean acidification on our planet but there is very little data and understanding about current acidification trends and potential impacts to oceanic food chains in the region," said USGS oceanographer Lisa Robbins. "This research should provide us with greater insight into this growing climatic concern."

Field experiments are currently being run in tropical and temperate environments to determine the extent

calcification rates are already changing, but little is known about the chemistry of the Arctic Ocean and whether changes are already having impacts on the innumerable calcifying organisms that inhabit its' waters.

The research is taking place during the 2011 U.S. - Canada Extended Continental Shelf Survey research expedition; a joint mission led by the University of New Hampshire's Center for Coastal and Ocean Mapping/Joint Hydrographic Center, the National Oceanic and Atmospheric Administration, and the Canadian Geological Survey, in which the USGS is a principal collaborator.

During this voyage, the USGS scientists, along with researchers from the University of South Florida, will collect and analyze water samples using an array of highly specialized instruments including sampling bottles that can collect water from as deep as 3500 meters. Instruments will also pick up measurements on dissolved oxygen content, conductivity, temperature, and depth in the water column.

"Sampling from a variety of environments and depths in the Arctic will provide a robust data set that we can use to compare our techniques as well as give us an overall picture of ocean chemistry changes throughout the water column," said USGS oceanographer Kim Yates.

Last year the team spent five weeks on board Healy collecting water samples. This included sampling the Arctic Ocean continuously every two minutes and collecting more than 25,000 data samples. Preliminary data from 2010 is currently being processed and analyzed for trends and will be published later this year. Data from this summer's survey will provide further information towards ocean chemistry trends.

"Ocean acidification can have broad global impacts on industry, ecosystems, tourism, and policy, so it is of vital importance to determine trends and whether impacts are already occurring in oceans around the world," said Robbins.

People interested will be able to track the ocean acidification research team during their voyage in the Arctic on their cruise journal. Additionally, a slideshow on USGS arctic acidification research that includes photos from last year's cruise is available online.

www.usgs.gov

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5. Climate change leads to spike in northern shipping

Alaska Dispatch
August 12, 2011

The Norwegian Barents Observer reports that Russia's Ministry of Transport is expecting a more than 3,500 percent increase in shipping traffic along the Northern Sea Route in the next decade. The Northern Sea Route -- a Russian term that can be broadly considered to encompass all the seas north of that country and is sometimes also called the Northeast Passage -- saw 1.8 million tons of cargo in 2010, and the Ministry of Transport estimates that number will rocket to 64 million tons by 2020.

"All of Russia's ambitious plans for development of the Arctic are connected with the Northern Sea Route," the article reports, and says that a lack of icebreakers and infrastructure in the Arctic are holding back further development. Russia is addressing at least one of those problems with plans to build six new icebreakers -- including three nuclear-powered ones. Read more here, and check out a report on the ships that traveled through the Northern Sea Route in 2010 here.

www.alaskadispatch.com

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6. Arctic warming unlocking a fabled waterway

By Jackie Northam
National Public Radio
August 15, 2011

Listen to the story

The Arctic may be the world's next geopolitical battleground. Temperatures there are rising faster than anywhere else in the world, and the melting ice will have profound consequences for the roof of the world, opening strategic waterways to shipping, reducing the ice cap on Greenland, and spurring a rush to claim rights to the wealth of natural resources that lie beneath. NPR examines what's at stake, who stands to win and lose, and how this could alter the global dynamic.It appears as just a speck on the horizon, a slightly darker shape against a vista of Arctic ice. Soon enough, the ship's bridge makes the announcement: "Polar bear, starboard."

Crew and passengers onboard the CCGS Louis S. St.-Laurent, Canada's largest icebreaker, head to the open deck, binoculars and cameras ready, and watch as the bear lumbers from one ice floe to another, quickly dipping into the inky blue water and effortlessly pulling himself back up again.

Often, a bear will head toward the ship and gaze up at the people gazing down at it, head tilted to one side. The massive creatures don't demonstrate any fear, just curiosity.

That's likely because they rarely see anything like a ship passing through the Northwest Passage, a series of waterways winding through Canada's Arctic archipelago of 36,000 islands. It's midsummer and the first time the coast guard icebreaker, affectionately known as the Louis, is making its way through the ice-choked waters this season.

But temperatures in the Arctic are rising faster than anywhere else in the world, making the Northwest Passage easier to navigate. As the ice melts faster, the vitally strategic waterway is expected to open up for longer periods of time - an attractive notion for shipping companies hoping to shorten trade routes and gain easier access to economic powerhouses such as China and India, as well as for nations within the Arctic Circle jockeying for vast, untapped natural resources.

'Everything Is Going To Change'
For hundreds of years, the Northwest Passage has been prized as a potential transit route across the polar region, linking the Atlantic and Pacific oceans and greatly reducing transit times for ships that would have relied on the long, southern route through the Panama Canal. In the past, it proved to be a dangerous and difficult waterway, and the chilly Arctic waters hold the wrecks of earlier attempts to navigate the passage.

Andrew McNeill, captain of the Louis, says it's not nearly as difficult as it was when he first started sailing in Arctic waters some 30 years ago.

"My first season here was, it was 36 hours of constant ramming of ice to get through this area. ... There's been times when the ship has had to reschedule events because of delays getting through the passage," he recalls.

As the Louis makes its way through the waterway, it slices easily through the polar ice sheet. It's mesmerizing: Enormous blocks of shimmering ice shoot up, twist onto their sides and bob along in the clear water, regrouping in the ship's wake.

Eddy Carmack, a leading oceanographer with Fisheries and Oceans Canada, has carefully charted the changes in the Arctic since he first visited in 1969. He is part of a diverse group of business, science and government leaders who are traveling aboard the Louis, brainstorming about the Arctic and its future. The ship is wending its way from Newfoundland in Canada's northeast, with stops in Resolute and Cambridge Bay, all the way, ultimately, to the Beaufort Sea off the country's northwest coast.

Carmack says the ice on this voyage looks the same as earlier trips he's made on the Northwest Passage, but it has a different feel.

"I would say what we're experiencing now is softer ice, it's not as formidable, it's yielding to the pressure of the ship, it's breaking easily. And that's because the ice itself is warmer," he says.

Rising air and water temperatures in the Arctic mean there is less ice each year, and for longer periods of time. Steve MacLean, president of the Canadian Space Agency, says that trend is expected to continue throughout the Northwest Passage.

"It's always opened up for the last 15 years for about six weeks in the summer. Now it is expected that period will extend. And because it's going to extend, everything is going to change," MacLean says.

Historically, that season has generally spanned late July into early September - and sometimes as late as October.

These longer periods of ice-free waters will likely mean more vessels trying to navigate the narrow straits and channels of the Northwest Passage, including commercial shippers looking for a shortened trade route. Yet only about 10 percent of the Northwest Passage is charted.

Competing Claims In The Region

As the waterway opens up, so, too, does the issue of who controls it. The U.S. and other nations see it as an international waterway that just happens to pass through Canada's Arctic region. Under that premise, Canada would not have the right to deny passage to foreign ships.

But Canada calls the Northwest Passage an internal waterway, and maintains it has the right to regulate and protect the passage. Leona Aglukkaq, Canada's minister of health, is from Gjoa Haven, a tiny town along the Northwest Passage. She says Canada's sovereignty over its land and its waters in the Arctic is longstanding and well-established.

"Our position is that these waters are Canadian, subject to full Canadian regulation and control. And [foreign vessels] only enter Canadian internal waters with the consent of Canada. That's our position; that remains our position," Aglukkaq says.

Last year, Canada released a new northern strategy that emphasized how it would bolster its sovereignty claims. That includes increasing scientific and environmental research of the region, and promoting exploration, along with economic development and governance of the indigenous communities.

Canada is beefing up military operations in the Arctic as well, and is conducting a five-year, $100 million study of the region's natural resources - oil, gas and minerals. It's believed that more than 20 percent of the world's oil and gas reserves are hidden in the Arctic.

David Boerner, a director general of the Canadian Geological Survey, says he believes those figures are generally "in the right ballpark." But he says they're often underestimated because geologists aren't able to conduct enough detailed work to establish the full extent of the resources.

Canada has also been mapping the Arctic seabed to determine how far its land mass, or continental shelf, extends past its visible coastline. This is critical to proving its right to resources under the water. Canada has until 2013 to present its case to the United Nations. The U.S., Russia and others are doing the same.

Warwick Vincent, director of the Center for Northern Studies at Laval University in Quebec City, says there's a need to quickly put international border and sovereignty agreements into place because development of the region is already taking place. And, he says, it's accelerating.

"Right at this moment, the Arctic is experiencing unprecedented transformation as a result of not only climate but as a result of economic development. So we need those regulations in place, rapidly," Vincent says.

Challenges Remain In Inhospitable Terrain

Even if all of these claims are settled, the Arctic is still an extremely difficult place to operate, says Martin Bergmann, director of Natural Resources Canada's Polar Continental Shelf Program, a key logistical facility for research in the Arctic.

"The Arctic in Canada is basically the size of Europe, has maybe 30 kilometers of roads, no trains, very few airports," Bergmann says, adding that about 30 communities have the capability to land small aircraft on gravel.

Bergmann says sealift - the main form of bringing heavy cargo and larger equipment to the region - only happens "once a year when a ship visits the Arctic, just like Christmas comes once a year."

But the land and the weather are inhospitable, and the waters will stay frozen for much of the year for decades to come. And that, geophysicist Boerner says, makes it extremely expensive to do any kind of work in the area. Given all that, he says, it's unlikely there will be a mad rush to the Arctic by oil and gas companies anytime soon.

"You don't really know what's there until you've tried to extract it or drill it. ... It's also not sort of who gets there first. There are well-established regulatory regimes for giving out land, and giving the rights to explore and ... a whole bunch of environmental checks and controls and balances," he says.

Given the warming trend, development is inevitable in the Arctic. Yet despite the changes, McNeill, captain of the Louis, says he still feels the magic, and mystique, as he journeys through this pristine, mostly unexplored area.

"It's an untouched area; very few people come through here still," McNeill says. "You feel very humbled and fortunate to experience that, and you can relate to the hardships that those early explorers and traders had to deal with back then."

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