

# Northern Climate ExChange

*Independent Information - Shared Understanding - Action on Climate Change*

NCE Update November 25, 2009

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## Announcements

### 1. A final warning from the Arctic - Photo Gallery - November 24

The Greenland ice sheet is five kilometres thick and melting fast. The effect of adding all that water to the oceans may become terrifyingly apparent around the world in the coming decades, but the effects of climate warming are already clear in the Arctic itself.

Here's the evidence, in words and pictures by Alun Anderson, former editor-in-chief of New Scientist and author of **After the Ice: Life, death and politics in the new Arctic** (published this month by HarperCollins-Smithsonian in the US and Virgin Books in the UK).

[www.newscientist.com](http://www.newscientist.com)

### 2. CPAWS Manitoba releases new report "Caribou and You"

The Manitoba Chapter of the Canadian Parks and Wilderness Society (CPAWS) recently released its new report entitled **"Caribou and You"**. The report tells the story of the woodland caribou's decline and how saving the threatened species from extinction will help slow the affects of climate change.

Read the [Caribou and You](#) report.



[www.cpawsmb.org](http://www.cpawsmb.org)

### **3. NASA - Climate Change Multimedia Resource Reel**

In anticipation of the United Nations Climate Change Conference in Copenhagen, NASA has released an on-line collection of NASA's best videos and visualizations of climate change.

<http://climate.nasa.gov/ClimateReel/>

### **4. GLOBAL DAY OF ACTION - International Demonstrations on Climate Change, December 12th 2009.**

The **Global Day of Action** on climate has occurred every year since 2005 at the time of the annual United Nations Talks on climate change (the COP or "Conference of Parties" to the United Nations Framework Convention on Climate Change or UNFCCC). People from all around the world have come together on the same day to demand urgent action on climate, and climate justice, from the governments of the world meeting at the annual climate talks. The Global Day of Action 2009 will take place **December 12**, during the United Nations Talks on climate change (COP15/MOP5) in Copenhagen, Denmark.

[www.globalclimatecampaign.org](http://www.globalclimatecampaign.org)

## **Articles**

### **1. Impact of Climate Change on Yukon Forests Studied**

Yukon Government  
Press Release #09-270  
November 23, 2009

WHITEHORSE - The Government of Yukon is studying the impacts of climate change on Yukon forests with a comprehensive three-year research initiative that started this year.

"Northern tree species are particularly susceptible to the challenges of climate change," Energy, Mines and Resources Minister Archie Lang said. "Fully understanding this challenge is key to ensuring the long-term sustainable management of Yukon's forests."

Led by the Forest Management branch, the research will investigate the vulnerabilities to climate change and adaptive capacities of Yukon tree species and forest ecosystems. Forest research is one of the adaptation actions called for in Yukon's Climate Change Action Plan.

Working in partnership with the University of Northern British Columbia (UNBC), the research began with an assessment of current knowledge on Yukon forest vulnerability and preliminary field work to examine forest-environment relationships under a variety of conditions.

Funding and staff support for the research initiative is being provided by UNBC and the Government of Yukon with an additional \$175,000 commitment by Indian and Northern Affairs Canada under the Impacts and Adaptation fund.

The study area for the project includes all the forested areas of Yukon with particular emphasis on areas where forest management planning is completed or underway. Researchers will develop a Yukon framework and methodology to apply the findings of this study and the recently released Canadian Council of Forest Minister's (CCFM) report entitled Vulnerability of Canada's Tree Species to Climate Change.

"Climate change may already be impacting Yukon's forests and these impacts are expected to increase over the coming century," Lang added. "This project will provide critical information on the impacts of long-term

climate change."

For more information on the Forest Management Branch research or to download the CCFM report, visit <http://www.forestry.gov.yk.ca/>.

[www.gov.yk.ca](http://www.gov.yk.ca)

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## 2. Aquatic Bacteria: Possible Markers for Monitoring Arctic Climate Change

ScienceDaily

November 24, 2009

New research on bacterial communities throughout six large Arctic river ecosystems reveals predictable temporal patterns, suggesting that scientists could use these communities as markers for monitoring climate change in the polar regions.

The study, published this week in the Proceedings of the National Academy of Sciences Early Edition, shows that bacterial communities in the six rivers shifted synchronously over time, correlating with seasonal shifts in hydrology and biogeochemistry.

The research team documents these patterns through a three-year, circumpolar study of planktonic bacterial communities in the six largest rivers of the pan-arctic watershed: the Ob', Yenisey, Lena, Kolyma, Yukon, and Mackenzie Rivers.

"Our results demonstrate that synchrony, seasonality and annual reassembly in planktonic bacterial communities occur on global scales," said lead author Dr. Byron Crump of the University of Maryland Center for Environmental Science Horn Point Laboratory. "Since bacterial communities in big arctic rivers shift predictably with circumpolar seasonal changes in environmental conditions, they may serve as sensitive indicators of climate change in the Arctic."

"The six river systems studied are comparable in size to the Mississippi River in the United States," said coauthor Rainer Amon of Texas A&M University at Galveston. "One of the things we learned is the bacteria communities in all six of them seem to be very similar. There are many questions still to be answered, such as how these bacteria communities might respond to a continued increase in temperature."

This synchrony indicates that hemisphere-scale variation in seasonal climate sets the pace of variation in microbial diversity. Moreover, these seasonal communities reassembled each year in all six rivers, suggesting a long-term, predictable succession in the composition of big river bacterial communities.

Divergence from this synchronous pattern may provide an early signal of climate change in some regions of the Arctic, and may result in changes to river microbial communities and the biogeochemical transformations that they carry out.

Data for this study was collected through the PARTNERS program, a collaboration among scientists from the U.S., Canada and Russia examining the largest rivers of the pan-arctic watershed. By including five of the world's 25 largest rivers in the study, the results provide a unique perspective on global-scale patterns in bacterial diversity.

Adapted from materials provided by University of Maryland Center for Environmental Science, via EurekAlert!, a service of AAAS.

### Journal Reference:

Byron Crump, Bruce Peterson, Peter Raymond, Rainer Amon, Amanda Rinehart, James W. McClelland and Robert Holmes. [Circumpolar synchrony in big river bacterioplankton](#). *Proceedings of the National Academy of Sciences*, 2009; (in press)

[www.sciencedaily.com](http://www.sciencedaily.com)

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### **3. Climate change causing 'corrosive' water to affect Arctic marine life: study**

By Margaret Munro  
Canwest News Service  
November 19, 2009

Scientists have uncovered a large expanse of "corrosive" water in the Canadian Arctic that is putting the marine food web at risk.

The waters have been so altered by climate change and melting sea ice that plankton, shellfish and fish may have trouble building their protective shells and skeletons, an international team reports Friday in the journal *Science*.

The oceanographers have documented a "rapid" drop in the levels of carbonate, a compound used to produce shells and bones, in the top 50 metres of the surface waters of the Beaufort Sea and more northerly Canada Basin over the last decade. The levels are now so low the water is at "corrosive" levels and they warn the "Arctic ecosystem may be risk."

"In actual fact, they'll dissolve the shells," says co-author, Fiona McLaughlin, a research scientist with Fisheries and Oceans Canada.

The Arctic marine system has been hit by what McLaughlin describes as a "triple whammy" - acidification of sea water, stunning rates of ice melt, and upwelling from the deep ocean.

The first is related to the way the world's oceans are growing more acidic because they soak up about a third of the carbon dioxide pumped into the atmosphere through the burning of fossil fuels. The CO<sub>2</sub> makes sea water more acidic and decreases the availability of carbonate, which could be potentially catastrophic to marine ecosystems.

McLaughlin says in the Arctic, this acidification process is happening faster than in southern regions because cold water absorbs more CO<sub>2</sub> than warm water.

The remarkable retreat and thinning of the Arctic sea ice has had an even more pronounced impact on the carbonate levels, the team reports. Sea ice contains extremely low levels of the compound, which is squeezed out of the ice as it crystallizes. And melting ice has generated huge volumes of low-carbonate water, diluting and reducing the concentration of the shell-building compound in the top 50 metres of water, which are normally the most productive.

McLaughlin recalls how in the late 1980s, the impenetrable ice pack confined the scientists and their icebreaker, CCGS *Louis St. Laurent*, to the southern Beaufort. In recent summers they have been able to cruise through open water hundreds of kilometres north into the Canada Basin. "It's great for science and being able to explore," she says. "But jeppers, I did not expect in my lifetime for this to occur."

The ice retreat has also led to a third process putting the ecosystem at risk. Winds now howl across open waters once covered by pack ice, and storms can carry deep water up onto the shallow continental shelf in the southern Beaufort, the researchers report. Like melted sea-ice, these deep waters are low in shell-building carbonate.

The corrosive waters are now confined to the Arctic, but they're expected to start flowing into the North Atlantic in about 10 years. "Water doesn't stay in the Arctic forever," says McLaughlin.

She says the findings underscore the urgent need to slow climate change. "What this is saying is that we have to control CO<sub>2</sub> emissions," says McLaughlin. "That's the only way that we can stop processes such as acidification of the oceans."

The impact on the ecosystem is not fully understood, but the low carbonate levels now common to the

surface waters have been shown by other researchers to dissolve and pit the shells of marine organisms.

The Science report says shell-forming plankton and shellfish in the Arctic are likely already affected. It points to a tiny Arctic pteropod, or sea butterfly, as an important link in the food web. Its larvae normally concentrate in the top 50 metres where the changes have been "most profound."

The report is based on measurements taken between 1997 and 2008 by McLaughlin, Michiyo Yamamoto-Kawai and Eddy Carmack at the federal Institute of Ocean Sciences near Victoria. Thousands of water samples were taken on research cruises on CCGS Louis St. Laurent that covered a huge area about 1,000 kilometres across.

Researchers are now increasing the sampling area in collaboration with Japanese scientists exploring more northern waters. Preliminary results for 2009 show that surface waters low in carbonate are expanding and the scientists expect the levels to keep dropping until multi-year ice melts away completely. Forecasters predict the Arctic could be ice-free in summer by 2030, if not before.

[www.canada.com](http://www.canada.com)

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#### **4. International expedition investigates climate change, alternative fuels in Arctic**

EurekaAlert  
November 20, 2009

Scientists from the Marine Biogeochemistry and Geology and Geophysics sections of the Naval Research Laboratory (NRL) organized and led a team of university and government scientists on an Arctic expedition to initiate methane hydrate exploration in the Beaufort Sea and determine the spatial variation of sediment contribution to Arctic climate change. Utilizing the U.S. Coast Guard Cutter Polar Sea as a research platform, three cross-shelf transects were surveyed and sampled off Alaska's North Slope at Hammerhead, Thetis Island and Halkett representing three regions of the Alaskan shelf. The expedition integrated expertise in coastal geophysics, sediment geochemistry, dissolved and free methane fluxes through the water column and into the atmosphere, sediment and water column microbiology and biogeochemistry and detailed characterization of the sub-seafloor geology.

"The objective of the sampling is to help determine variations in the shallow sediment and water column methane sources, methane cycling and the subsequent flux to the atmosphere," said Richard Coffin, chief scientist, NRL Chemistry Division.

The content, location and distribution of methane in hydrate is variable and controlled by geothermal gradients and biological and thermal methane production. Large deposits of methane hydrates, frozen mixtures of hydrocarbon gas (mostly methane) and water, occur over large areas of the ocean floor. International research has begun with a primary goal of obtaining the methane in these hydrates as an energy source.

During the 12-day expedition, Methane In The Arctic Shelf and Slope (MITAS-1), the crew conducted 34 conductivity-temperature-depth (CTD) water column casts using a rosette of Niskin bottles and collected sediment samples from 14 piston cores, three vibrocores and 20 multicores. Regions selected for this study were based on the review of Minerals Management Service and U.S. Geologic Survey (USGS) seismic data with specific sample locations decided onboard through review of the 3.5 KiloHertz (kHz) sub-bottom profiler data.

The MITAS-1 crew focused on six primary goals to include:

- Acquire and integrate seismic, acoustic, temperature, geochemical, and lithostratigraphic data for evaluation of deep sediment hydrate distributions.
- Estimate spatial variation and controls on the vertical methane flux as it relates to variations in lithostratigraphy, geologic structures, water column temperatures, heat flow, seismic and acoustic profiles, and water depth.

- Develop and calibrate models to evaluate sediment hydrate loading, hydrate destabilization through warming, and the fate of methane after destabilization.
- Determine and model the transport of methane from the sediment through the water column into the atmosphere.
- Study the control of total methane emissions by microbial methane consumption in the sediment and in the water column.
- Study the contribution of methane to the benthic and pelagic carbon cycling.

The expedition was supported by NRL, Office of Naval Research (ONR), Department of Energy (DoE), Royal Netherlands Institute for Sea Research (NIOZ), French Research Institute for Exploitation of the Sea (IFREMER) and the German Leibniz Institute of Marine Sciences (IFM-Geomar). Future expeditions will also include scientists from Scotland's Herriot-Watt University, Norway's University of Bergen and GNS Science of New Zealand.

"Our project is intended to initiate a long-term collaboration in future expeditions in the Beaufort Sea and other regions of the Arctic Ocean," said Coffin.

[www.eurekalert.org](http://www.eurekalert.org)

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## 5. Greenland ice loss behind a sixth of sea-level rise

New Scientist  
November 21, 2009

GREENLAND lost 1500 cubic kilometres of ice between 2000 and 2008, making it responsible for one-sixth of global sea-level rise. Even worse, there are signs that the rate of ice loss is increasing.

Michiel van den Broeke of Utrecht University in the Netherlands and colleagues began by modelling the difference in annual snowfall and snowmelt in Greenland between 2003 and 2008 to reveal the net ice loss for each year. They then compared each year's loss with that calculated from readings by the GRACE satellite, which "weighs" the ice sheet by measuring its gravity.

The team found that results from the two methods roughly matched and showed that Greenland is losing enough ice to contribute on average 0.46 millimetres per year to global sea-level rise. The loss may be accelerating: since 2006, warm summers have caused levels to rise by 0.75 millimetres per year, though van den Broeke says we can't be sure whether this trend will continue (Science, [DOI:10.1126/science.1178176](https://doi.org/10.1126/science.1178176)). Sea levels are rising globally by 3 millimetres on average.

Half the ice was lost through melting and half through glaciers sliding faster into the oceans, the team says. "The study gives us a really good handle on how to approximate how much ice Greenland is going to lose in the coming century," says Ted Scambos of the US National Snow and Ice Data Center in Boulder, Colorado.

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## 6. Unchecked Climate change will put world at 'tipping point', WWF and Allianz report says

WWF  
November 23, 2009

The world's diverse regions and ecosystems are close to reaching temperature thresholds - or "tipping points" - that can unleash devastating environmental, social and economic changes, according to a new report by WWF and Allianz.

Often global warming is seen as a process similar to a steady flow of water in our bathrooms and kitchens,

where temperature goes up gradually, controlled by a turn of the tap.

But the report 'Major Tipping Points in the Earth's Climate System and Consequences for the Insurance Sector' documents that changes related to global warming are likely to be much more abrupt and unpredictable - and they could create huge social and environmental problems and cost the world hundreds of billions of dollars.

Without immediate climate action, sea level rise on the East Coast of the USA, the shift to an arid climate in California, disturbances of the Indian Summer Monsoon in India and Nepal or the dieback of the Amazon rainforest due to increasing drought, are likely to affect hundreds millions of people and cost hundreds of billions of dollars.

The study explores impacts of these "tipping points," including their economic consequences and implications for the insurance sector. It also shows how close the world is to reaching "tipping points" in many regions of the world, or how close we are to tipping the scales toward disaster.

"If we don't take immediate action against climate change, we are in grave danger of disruptive and devastating changes," said Kim Carstensen, the Head of WWF Global Climate Initiative. "Reaching a tipping point means losing something forever. This must be a strong argument for world leaders to agree a strong and binding climate deal in Copenhagen in December."

According to the report, carried out by the Tyndall Centre, the impacts of passing "Tipping Points" on the livelihood of people and economic assets have been underestimated so far. The report focuses on regions and phenomena where such events might be expected to cause significant impacts within the first half of the century.

"As an insurer and investor, we must prepare our clients for these scenarios as long as we still have leeway for action," says Clemens von Weichs, CEO of Allianz Reinsurance. "Setting premiums risk-appropriately and sustainably is of vital interest to everyone involved, because this is the only way to ensure that coverage solutions will continue to exist."

Allianz intends to address climate change by entering into dialogue with its clients at an early date. This will allow it to point out countermeasures in a timely way, and work together to develop specific coverage concepts, whether for existing assets or for future climate-compatible projects like alternative energy and water supply concepts, dyke construction, or protection against failed harvests.

Global temperatures have already risen by at least 0.7 degrees Celsius. Global warming above 2-3 degrees in the second half of the century is likely unless strong extremely radical and determined efforts towards deep cuts in emissions are put in place before 2015.

The melting of the Greenland (GIS) and the West Antarctic Ice Shield (WAIS) could lead to a Tipping Point scenario, possibly a sea level rise of up to 0.5 meters by 2050. This is estimated to increase the value of assets at threat in all 136 global port mega-cities by around 25.000 billion USD.

On the North-eastern coast of the USA and due to a localized anomaly, the sea level could rise up to 0.65 meters, increasing the asset exposure from 1.350 to about 7.400 billion USD

The South Western Part of the USA, namely California, is likely to be affected by droughts and levels of aridity similar to the Dust Bowl in the 1930s. The annual damages caused by wildfires could be tenfold compared to today's costs and could reach up to 2.5 billion USD per year by 2050 increasing to up to 14 billion by 2085.

70 percent of working population may be put at risk by droughts in India. The future costs of droughts are expected to rise to approx. 40 billion USD per decade until the middle of the century.

In a tipping point scenario, dieback of the Amazon Rainforest could reach 70% by the end of the century as a consequence of a significant increase in the frequency of droughts in the Amazon basin. The impacts include loss of biodiversity and massive carbon release. Costs could reach up to 9.000 billion USD for a surface of around 4 million square kilometers.

"The Tipping Points report shows how quickly we are approaching dangerous and irreversible levels of global warming," Carstensen said. "Economic consequences of passing the climate tipping points are absolutely overwhelming."

"There is still a chance to avoid the worst and this report shows how urgent it is to act immediately. A strong climate agreement in Copenhagen in December is the best, if not the only chance to prevent the worst impacts of devastating climate change."

Today's insurance industry has learned lessons from its experiences after major losses caused by hurricanes like Andrew (1992), Ivan (2004) and Katrina (2005). Better models will help people understand the frequency and strength of natural disasters. "But good models will not be enough to protect the climate," explains Michael Bruch, of Allianz Global Corporate & Specialty, the Allianz Group's industrial insurer. "The human component is playing an ever-increasing role in reducing the risk from natural disasters, in terms of both risk management and combating the human causes of climate change."

Download: [Canadian Aspects of the Tipping Points Report \[doc, 60 KB\]](#)

[www.wwf.ca](http://www.wwf.ca)

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## **7. Rising CO<sub>2</sub> could cause catastrophic sea level rise finds Antarctic study**

*Sea levels could rise by up to 20ft (6m) if the world fails to get pollution under control, according to the latest study in the Antarctic.*

By Louise Gray  
Telegraph  
November 19, 2009

The British Antarctic Survey (BAS) found that during past periods of high carbon dioxide, temperatures in Antarctica were up to 6C above current levels. This could cause a sea level rise of up six metres, threatening coastal cities like London, New York and San Francisco.

It is the latest research to warn of the consequences of increased greenhouse gases on the Earth's climate. Yesterday a study warned that carbon dioxide produced by man is now rising at record rates putting the world on a pathway for a 10.8F(6C) rise in temperature.

All the recent studies are adding pressure on world leaders to agree in international deal on climate change at a UN summit in Copenhagen this December.

Louise Sime, lead author of the BAS study, looked at ice cores to see how temperatures changed during periods of high carbon dioxide.

She found that during the last period of high CO<sub>2</sub>, 125,000 years ago, temperatures were up to 10.8F(6C) higher than present day levels.

Such a hike in temperature could lead to a rise in sea levels of between 13 to 20ft (4 to 6 m) over hundreds of years as the ice sheets melt.

"We didn't expect to see such warm temperatures, and we don't yet know in detail what caused them. But they indicate that Antarctica's climate may have undergone rapid shifts during past periods of high CO<sub>2</sub>."

Dr Sime said the study suggests that current high levels of CO<sub>2</sub> could also cause a rise in temperature. She said further research could predict the affect on sea level rise.

"If we can pin down how much warmer temperatures were in Antarctica and Greenland at this time, then we can test predictions of how melting of the large ice sheets may contribute to sea level rise," she added.

A study out yesterday found that carbon dioxide levels have risen by almost a third since 2000. The research in Nature Geoscience warned that if the world continues to pump out pollution at such a rate it will cause temperatures to rise by 10.8F (6C), causing massive droughts, extinction of species and sea level rise.

Today another study in Nature added to the urgency by claiming that the oceans are losing their ability to absorb CO2. Samar Khatiwala, of Columbia University, found that the proportion of fossil fuel emissions absorbed by the oceans since 2000 may have declined by as much as 10 per cent.

"What our ocean study and other recent land studies suggest is that we cannot count on these sinks operating in the future as they have in the past, and keep on subsidising our ever-growing appetite for fossil fuels," he said.

But Dr Wolfgang Knorr, of Bristol University, who has been studying the same subject said there is not yet enough evidence to prove that the Earth is losing its ability to absorb CO2.

[www.telegraph.co.uk](http://www.telegraph.co.uk)

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## **8. Arctic Venue at COP 15**

*A unique opportunity to learn more about the Arctic climate*

By Jesper Hansen  
Arctic Council  
Nov 25, 2009

The upcoming COP 15 in Copenhagen in December is a unique opportunity to present the dramatic changes in the Arctic climate to the rest of the world.

The so called Arctic Venue will take place at The North Atlantic Quay in Copenhagen from the 12th to the 18th December. Here you can meet the Arctic Council in a booth where new knowledge and findings from Arctic cooperation in the Arctic Council, and other Arctic stakeholders will be presented. It will be covering natural science, social science and cultural approaches to climate change and relate to local, regional and global perspectives.

The presentations inside and around the buildings may include exhibitions, booths, posters, lectures and debates or panel discussions, films, presentation of scientific equipment, sculptures, cultural items, television spots, experiments, technology solutions, interactive activities illustrating daily life in the Arctic, Arctic food and more.

The North Atlantic Quay presents an ideal venue for a joint and high impact presentation of the knowledge of Arctic climate change. For more than 200 years this building was the departure point for numerous Arctic expeditions. The historic buildings are prominently located at the harbour front in the centre of Copenhagen and are visible from all over the central harbour. Here you will find a variety of exhibition facilities, the embassies of the North Atlantic countries Iceland, Greenland and Faroe Islands and the world famous Nordic gourmet restaurant Noma.

During COP 15 the North Atlantic Quay will also be hosting several other Arctic oriented climate information initiatives. The main building will be wrapped up as an iceberg, eye-catching from distance. Symbolizing the fact that the climatic changes in the Arctic region is only the tip of the iceberg, this grand installation designed by Greenlandic artist Inuk Silis Høegh raises on the harbor front and gives a spectacular reminder of the beauty of the Arctic and Earth's fragility. The tip of the iceberg is 21 m high and approximately 4000 m<sup>3</sup>. A real iceberg with at visible tip of this size would then have a volume of 36000 m<sup>3</sup> going almost 200 m under ground level.

The exhibition will be open every day from 12th to 18th December, from 12.00 to 18.00.

[www.arctic-council.org](http://www.arctic-council.org)

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*The next Update from the Northern Climate ExChange will be sent out **Thursday, December 2, 2009***