

Northern Climate ExChange

Independent Information - Shared Understanding - Action on Climate Change

NCE Update November 12, 2009

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Announcements

1. Symposium: "The Arctic Climate system; its present status, future evolution and potential impacts"

The Damocles consortium and the DG Research of the European Commission invite all Arctic experts interested in participating to a Symposium in Brussels **November 10-12 2009**.

This symposium is intended to describe near future scientific and technological challenges for a better understanding of the Climate system at a time of human-induced rapid environmental changes.

[Download program.](#)

www.damocles-eu.org

2. Whitehorse Community Adaptation Project (WhiteCAP) - Bioregional Mapping Session

November 12: 6-9 pm
November 19: 6-9 pm
Yukon College, Room A2404

Northern Climate ExChange is developing bioregional maps to support climate change adaptation planning in the community. Bioregional maps communicate regional values.



Please come out and show us what about Whitehorse is important to you.

For more information contact:

Ryan Hennessey, Community Adaptation Project Manager,
668-8874, rhennessey@yukoncollege.yk.ca.

Snacks, tea and coffee will be provided.

www.taiga.net/nce/adaptation

3. Water2010: Hydrology, Hydraulics and Water Resources in an Uncertain Environment - Conference

Water2010 will take place in Quebec City, 5-7 July 2010 and includes a Session on '**Statistical Down-scaling of Climate and Environment: Methods and Applications**'.

Statistical downscaling (SD) models have become quite popular over the last decade. Their computational properties and flexibility make them serious competitors over dynamical approaches to provide local-scale generated data needed for many impacts studies of climate change and evolution.

The goal of this session is to present and/or propose new state-of-the-art algorithms and recent applications of statistical downscaling.

Abstracts can be submitted on-line through the [web site](#).

www.water2010.org

Articles

1. Permafrost's future in Alaska looks poor, but the forecast isn't all bad

By Jeff Ricahrdson
Fairbanks Daily News-Miner
November 6th, 2009

AIRBANKS, Alaska - Alaska probably will see most of its surface permafrost vanish by the end of this century, but researchers believe vast areas of frozen soil will remain deeper underground even as air temperatures increase.

The future of Alaska's permafrost is being closely watched by scientists because of the implications it may have on the climate as a whole. Vladimir Romanovsky, a professor at the University of Alaska Fairbanks Geophysical Institute, discussed evolving permafrost research this week during a teleconference through the Alaska Center of Climate Assessment and Policy.

Using models that predict a 4 to 6 degree rise in Alaska air temperatures by 2100, Romanovsky projects slowly vanishing areas of permafrost in the state. Dozens of bore holes are being monitored throughout Alaska to see how permafrost reacts to changing temperatures.

The research has both short-term and long-term significance. Unstable thawing permafrost can cause enormous damage to buildings and other infrastructure, and it releases gases that are widely believed to contribute to global warming.

"It could be a significant player in the carbon cycle in the atmosphere," Romanovsky said.

Virtually all of Alaska is a potential permafrost region, with only Southeast, the Aleutians and Kodiak Island spared from common permafrost patches. The North Slope and Brooks Range are almost entirely blanketed with permafrost, and most of interior Alaska is constantly frozen.

That's expected to change in the next century. Romanovsky and his team of UAF researchers predict a warming trend that will gradually thaw most of the state's surface permafrost. By the end of the century, only the North Slope will remain frozen. "It doesn't mean permafrost is disappearing," Romanovsky said, because the frozen soil is deeper and more vast than it appears.

Beyond a depth of about 30 feet, he said, the permafrost is generally expected to remain stable, regardless of the temperatures above.

Most of interior Alaska is classified as a discontinuous permafrost region, where 50 to 90 percent of the land is constantly frozen. The patches around Fairbanks range from 31.6 degrees to 28 degrees Fahrenheit and reach a depth of as much as 200 feet.

Near Prudhoe Bay, permafrost has been found at depths of 2,000 feet, Romanovsky said.

The surface warming is important, however, because most vegetation is located in the top 10 feet of permafrost. As it thaws, it releases a pair of greenhouse gases - methane and carbon dioxide.

With data going back as far as 50 years or more, researchers have seen mixed thawing patterns since the state emerged from a cold snap in the 1960s and 1970s.

Alaska saw a dramatic increase in permafrost thawing in the 1990s, but the trend has slowed in the past decade, particularly in inland areas.

In the Interior, the picture is muddled. Many permafrost sites have been largely unchanged this decade. A few permafrost areas have even seen cooling trends in the past three years.

Romanovsky said the explanation is probably a thin early winter snow cover in recent years. Without a thick layer of insulating snow, soil has a chance to freeze even harder in tussock-laden terrain.

"Some years the snow isn't deep enough to cover these tussocks," Romanovsky said. "You see a cooling effect."

Because of factors such as snow cover, predicting the rate of permafrost thawing can be imprecise. Romanovsky's projections also don't take into account the creation of new lakes and wetlands as surface permafrost thaws. Romanovsky said they could potentially cause more thawing at deeper levels.

"That could actually accelerate the destruction of permafrost," he said.

www.newsminer.com

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2. Scientists warn caribou collapse not unlike disappearance of cod stocks

By Bob Weber
The Canadian Press
November 6, 2009

Once, caribou wandered over the Arctic tundra in herds that took days to pass. So great were their numbers - even 20 years ago - that they were able to shake off man's puny imprint on the great barren lands like so many flies on a rump.

"There was so much caribou all over that even our plane, our scheduled flights, couldn't land on the airstrip," recalled Alfonz Nitsiza of Wha Ti, a tiny aboriginal community northwest of Yellowknife.

"The caribou were on the airstrip. It was full of caribou, all our communities were."

Today, scientists fear caribou are the new cod.

"If we want a counterpart to start looking at what may be happening with the caribou, look at the northern cod," said Anne Gunn, a caribou biologist and former Northwest Territories researcher.

Once a gigantic bloom of life that sustained entire societies, the cod fishery was closed in 1992 after a near-total collapse of fish stocks. The subsequent bust of Newfoundland's outport culture was nearly as complete.

Recent surveys on two major caribou herds in Canada's North suggest the same thing may be happening there. And as scientists begin to unlock the secrets of that decline, aboriginals who still depend on the great herds to feed both body and soul are rethinking old assumptions.

"The elders are saying that there is a cycle, that caribou go away somewhere but they come back," Nitsiza said. "This time, the caribou may not come back."

Biologists say 15 of the world's 23 herds are shrinking. Only six herds, generally the small ones, are growing.

"The worst is in the N.W.T.," said Don Russell, a former Canadian Wildlife Service biologist, who now heads the Circumarctic Rangifer Monitoring and Assessment network.

The Bluenose West herd, for example, which ranges over the northwest corner of the N.W.T., was under 20,000 animals in 2006 - a quarter its size at the turn of the millennium. Nine of Canada's 11 herds are in decline.

Concern has been building for years. But this summer, survey results carried a distinct whiff of impending catastrophe.

N.W.T. biologists estimated the Bathurst herd of the central barrens had fallen from over 120,000 animals in 2006 to 32,000 - a 75 per cent implosion representing the loss of nearly 90,000 caribou in only three years.

The news was even worse to the east, where scientists studied cow-calf pairs in the Beverly herd.

Aerial survey teams couldn't even find enough pairs to get statistically valid data. A herd that numbered 280,000 animals only 15 years ago was simply gone.

"Collapse. I think that's a good term," said Ross Thompson of the Beverly-Qamanirjuaq Management Board.

Caribou herds have always fluctuated, sometimes wildly. The George River herd in Arctic Quebec grew from as few as 5,000 animals in the early 1960s to 700,000 by the 1990s (although it's now shrinking).

But new factors are putting wobbles in the caribou cycle. Recent research is beginning to show how climate change, aboriginal hunting and industrial development may be preventing populations from recovering.

Climate change has long been suspected as being behind the recent widespread declines.

"Weather is the only thing that would operate on that big of a landscape scale," said Jan Adamczewski, a biologist with the N.W.T. government.

The territory is warming up faster than almost anywhere else on the globe. Temperatures already show a two-degree average increase since 1948 and higher increases further north.

Research also shows that warmer conditions are allowing southern shrubs to spread north and take over from plants such as lichen. Shrubs produce more plant material, but they aren't very good caribou food.

"On the summer range, forage biomass is increasing, but there's some indication that forage quality is decreasing," Adamczewski said.

Winter changes are even more significant. Warmer temperatures mean heavier, icier snow.

"The snow is not going to be so nice and fluffy and easy to kick aside when you want to dig through it to get your food," said Gunn.

Higher temperatures also improve conditions for warble flies, biting, bloodsucking bugs that drive caribou crazy and impair their ability to breed by preventing them from building their strength.

"I've seen (caribou) in July and they don't spend a lot of time feeding," said Adamczewski. "They spend a lot of time running around and trying to get away from these things."

Then there's the aboriginal hunt. Once pursued on dogsled by hunters depending on skill and local knowledge, caribou are now preyed upon from snowmobiles and pickups. Their range has been invaded by roads and cutlines, their locations widely tracked and shared.

Those changes mean hunters can still fill their freezers even if there are relatively fewer caribou, said Gunn.

"You can go a lot further on a snow machine. If you find them, you can take them easily. It's independent of abundance."

Some say the harvest was bigger in the old days, when hunters needed to feed their dogs as well as their families. But as recently as 2007, officials estimated aboriginals were taking 11,000 animals a year - enough, perhaps, to slow the recovery of already-depressed herds.

The third wild card is industry.

Caribou decline has coincided with unprecedented northern development that includes three diamond mines, oil and gas exploration and intensive mineral prospecting. Some of that development - uranium exploration in the Thelon, for example, on the N.W.T.-Nunavut boundary - is on or adjacent to calving grounds.

Many argue those developments are pinpricks in a vast and largely untouched wilderness. Others say they already disrupt caribou movement between winter and summer ranges and calving grounds.

Little is known yet about the effect of industry on the caribou, but studies suggest the animals tend to avoid coming within about 30 kilometres of diamond mine sites.

That's up to seven per cent of a herd's summer range when all three mines are combined, said Gunn. "They're pinpricks with a zone of influence around them."

None of these factors is suspected of being the main driver behind the collapse, but in combination it may be a different matter.

"The caribou's world is changing," Gunn said.

"We can measure these very strong signals of change, and we can't say that they caused 10 per cent of the decline, but they've got to be playing a role.

"The interplay between them is where we run up against the limits of our knowledge. We deal in probabilities and likelihoods. We never deal with certainty."

Adamczewski thinks back to his first field season in the North, his eyes lighting up as he describes the then-mighty Beverly herd as "a sea of animals."

He went back last summer.

"The animals just weren't around," he said. "We kind of blew that one."

www.ca.news.yahoo.com

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3. Tackling New Arctic Challenges From Space

RedOrbit

November 5, 2009

International scientists, researchers and decision makers met at the 'Space and the Arctic workshop' to identify the needs and challenges of working and living in the rapidly changing Arctic and to explore how space-based services can help to meet those needs.

The workshop, held from 20 to 21 October in Stockholm, Sweden, was organized by the Swedish National Space Board and the Swedish Meteorological and Hydrological Institute together with ESA, EUMETSAT and the EC.

The warmer climate, advances in technology and demand for natural resources are leading to increased human activity in the Arctic. This increase in activity, especially related to oil and gas production, changing fishery patterns and new shipping routes, provides new opportunities but also creates new risks to those working and living in the area and to the pristine and unique natural environment.

One of the highlights of the workshop was the 'Arctic Marine Transport and Space' presentation given by Dr Lawson Brigham of the University of Alaska Fairbanks that outlined the Arctic Marine Shipping Assessment (AMSA) report for 2009.

The AMSA report, prepared by the Protection of the Arctic Marine Environment (PAME) Working Group on behalf of the Arctic Council, is designed to educate and inform people about the current state of Arctic marine use and future challenges. It focuses primarily on Arctic marine safety and marine environmental protection.

"New space assets are crucial for improving marine communications in many regions of the Arctic Ocean in order to improve search and rescue and environmental response activities," Brigham said. "One key AMSA recommendation is the need for a comprehensive Arctic marine traffic awareness system; only space assets in the long-term can provide the coverage necessary to achieve effective monitoring and tracking of Arctic ships."

"Improved space sensors measuring sea-ice thickness, mapping snow cover and tracking icebergs will be increasingly important to Arctic ship safety and route optimization," he continued. "Continued satellite monitoring is also central to recording the retreat of sea ice and other changes to the cryosphere in a warming Arctic."

In order to build the infrastructure needed in the Arctic to meet these challenges, workshop participants investigated ways space infrastructure could facilitate communication, environmental monitoring, early warning systems and navigation and vessel tracking in the area.

The workshop was held under the auspices of the Swedish Presidency of the Council of the EU as part of a commitment to face the challenges of climate change and increased human activity. It focused on these main themes: climate change & environment; transport safety and security; and sustainable exploitation.

The contributions from ongoing activities in European projects such as MyOcean, Polar View and Damocles, were presented to show how lessons learned in setting up operational services for the Baltic area could be applied in a new setting with similar information requirements for the Arctic.

After presenting their experiences in the region, participants provided suggestions as to how operational space-based services could monitor and help adapt to climate change and ecosystem management, maintain safe transportation and ensure sustainable development in the vulnerable Arctic.

At the end of the workshop, participants agreed a set of conclusions and recommendations as to how space technology could help Europe meet its objectives in the Arctic.

ESA's ice mission, CryoSat, is scheduled to launch in February next year. CryoSat will monitor precise changes in the thickness of polar ice sheets and floating sea ice. The observations made over its three-year

lifetime will help explain the connection between the melting of the polar ice and the rise in sea levels and how this is contributing to climate change.

www.redorbit.com

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4. Arctic warming linked with Calif. droughts

By Wayne Freedman
ABC News
November 11, 2009

The Sierra Nevada is giving up age-old secrets that could help better understand climate change - evidence of what happens when the Arctic ice melts has been locked away, inaccessible in mountain caves until now.

In the study of climate change, this is a new frontier. In Moaning Cave, 200 feet below the Sierra Nevada, is where thousands of years of dripping rainwater evaporates, leaves stalagmites and in their chemical residue what may be a cautionary tale for present times.

"We have looked 10,000 years into the geologic record," says U.C. Davis geologist Dr. Isabel Montanez, who found her evidence by analyzing the chemical make-up of stalagmites in the caves. She dated and then correlated them with temperature records from ice cores taken in Greenland.

"When temperatures increase in the arctic, they reroute jet stream, which normally brings winter water to California."

"The chemistry of the rainwater changes based on temperature above the cave, the rainfall, and the vegetation there is," says U.C. Davis researcher Jessica Oster.

Oster will be getting her Ph.D. soon in paleoclimatology. While earning it, she, and Montanez have made a remarkable discovery, which shows a long-term, direct connection between rising arctic temperatures, and drought in the Sierra Nevada.

"What we know now is that repeatedly, in the past, as we warm up in the high latitudes, we're impacted here," says Montanez.

The stalagmites show four major droughts in 8,000 years and each of them coincides with core records of melting arctic ice. The shortest drought lasted decades. The longest lasted centuries.

"What the climate models tell us is that as we lose ice, the jet stream is very sensitive to that, and migrates northward as that ice amount decreases," says Montanez.

And it is the jet stream with its Pacific storms that delivers water to the Sierra Nevada and the rest of California. Which leads to an obvious question: Is this state's present drought connected to Arctic warming?

Academically, it is hard to say.

"There's a difference between weather and climate," says Oster.

"I can see that in the past that has been bad news in terms of our rainfall. Yes, I would guess that there is some connection that would be relevant, again," says Montanez.

It is evidence of history repeating itself, written in stone.

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5. In a changing North, the torch recalls tradition

Threatened by climate change, the Gwitchin of Old Crow reflect on the links between the Olympic flame and their own age-old values

By Gary Mason
Globe and Mail
November 5, 2009

As the migration of the Olympic flame continued north, it landed in a town that knows something about the vagaries of epic journeys.

Old Crow is one of the most remote communities the flame has ever visited. Situated on the banks of the Porcupine River in the northwest corner of the Yukon, it is accessible only by air or, in summer, by boat. The torch arrived here yesterday aboard a 737, the first time a jet has ever landed on the town's gravel runway. It was a big enough deal that residents stood in their backyards snapping pictures as the plane touched down.

Like in much of the Far North, the landscapes here stretch forever. Pine trees stand stick-straight atop snow-covered mountains. It is in this paradise that the Vuntut Gwitchin First Nations have lived off the land for hundreds of years.

It is a lifestyle that is now threatened.

Arctic warming is affecting the migration patterns of the Porcupine caribou. It would be difficult to overstate how big a role the caribou plays in the lives of the people of Old Crow. In their mythology, the Gwitchin derived from a heart shared with a caribou.

The caribou has roamed the northwestern plains for centuries. Scientists have determined it grazed beside mastodons and woolly mammoths. It has provided the Gwitchin with their main source of meat and hide for boots, moccasins and mitts. Every part of the caribou is used for something.

But their numbers are down. The route the caribou herds take each year from their calving grounds in Alaska, south past Old Crow in the fall, have become less predictable. Two years ago, the animals missed Old Crow altogether and inexplicably circled back to Alaska.

As he watched members of his band set up for a community celebration in honour of the torch's arrival, Chief Joe Linklater worried aloud for the future of his people. No one is sure why caribou numbers are down. But traditional feeding grounds have been overtaken by willows and weeds. The flora and fauna that the caribou feast on is growing much further north.

This is why some are now wondering how much longer the Gwitchin can maintain their traditional ways. "I think it has caused a great deal of stress in the community," said the Chief. "It is especially difficult for the young people. Our identity has always been tied up with the caribou, our heritage, our cultural identity.

"Now there is a real question of whether there will be caribou to hunt and salmon to fish. Salmon numbers are down considerably too."

Chief Linklater is one of the territory's more impressive young native leaders. Since the Gwitchin signed a self-government agreement several years ago, Mr. Linklater has led a management team that has invested the organization's treaty money wisely.

It has a 48.6-per-cent share of Air North, the most successful carrier in the Far North. The Gwitchin also hold extensive real estate holdings in Whitehorse. The chief is passionate about climate change and plans to attend the United Nations conference on the crisis in Copenhagen in December.

But he is also a committed Canadian, one who proudly displayed his excitement about the Olympic flame's arrival. He called it a great honour, a recognition of Old Crow's uniqueness. He thought it would make young people feel good that others appeared to care about their town.

The Gwitchin hosted a torch celebration at the local school. It included a fashion show and musical presentation by a group of fiddlers and guitarists. There was a traditional feast of caribou, salmon and

bannock.

The most compelling moment of the afternoon, however, occurred when a young man named Kyikavichik took to the stage to tell the story of his ancestors. He praised them for the hard life they endured. He talked about the fences they erected in -50 degree temperatures to help corral caribou. He told the audience that when anyone enjoyed a particularly bountiful kill, they shared their meat with others.

Kyikavichik's cadence and timing was impeccable. The gym was stone silent as he spoke.

He compared the obstacles and challenges that his ancestors faced, and their sharing nature, with the torch relay. The relay was founded on the notion of sharing, he said, and had its own share of hurdles to confront as well.

"For that reason," he said, "I can't think of a better place for the torch to visit."

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6. Arctic scientists deflated by climate change sceptics

by Catherine Marciano
Agence France-Presse
Students on Ice
Nov 11, 2009

Tromsø, Norway - As the world climate summit closes in, scientists monitoring the impact of global warming in the far north have grown frustrated by public apathy and disbelief about the extent of the problem.

"Measuring ice thickness is extremely difficult," says Edmond Hansen, an arctic change researcher at the Norwegian Polar Institute meticulously charting the effects of climate change, ahead of the December 7-18 Copenhagen summit.

"Satellites can't do it for the moment. You have to drill into the ice and use electro-magnetic techniques," he says at his office in the fjords of Tromsø, a university town on the same latitude as Siberia.

He has just got back from his annual trip, closer to the North Pole, with new measurements to complete graphs plotting the change wrought by greenhouse gases.

For the past 11 years, Hansen has been positioning himself at the same spot on Fram Strait, between Greenland and the Spitzberg (administered by Norway).

He measures currents, temperatures and the salinity of the slowly warming Arctic waters which promise to bring a king tide of climate change to Northern Europe.

That's millions of euros for every expedition, to pay a staff of 30, an ice-breaker with a laboratory and a helicopter. Plus a continuous fight to get fresh cash to continue research, which takes up most of Hansen's energy.

"It takes years getting a graph out" from which to draw scientific conclusions, he points out with some bitterness.

"I'm frustrated by the lack of willingness to understand. The general problem in the field is the lack of respect for the knowledge of climate scientists."

Jan-Gunnar Winther, director of the Norwegian Polar Institute, regrets that half of the population of Norway "doesn't believe in climate change," compared to 97 percent of scientists.

"That worries me because the general public has a connection to politicians. They are voters," he said.

"We need to act and it's the politicians' responsibility to act."

"Arctic glaciers are melting, over 10 years you can see the changes with your own eyes," but for the general public "it's mentally very difficult to understand," Winther concedes.

And rich Norwegians don't want to change their comfortable way of life, like most people living in the Northern hemisphere.

Recent scientific research seems however to point out that the future could be even bleaker than forecast.

The Intergovernmental Panel on Climate Change (IPCC) - whose report serves as a signpost for the UN talks in Copenhagen and brings together existing scientific data - came out with its last benchmark report in 2007.

The next updated version could include "worse numbers when it comes to global sea level," believes Jan-Gunnar Winther.

A Danish researcher has, for example, just calculated that Greenland's melting ice will result in a 14-centimetre global sea rise by the end of the century, instead of the five centimetres included in the last IPCC report, he points out.

But there is already "enough evidence and consequences that are so serious that politicians have enough information for decisions to be made", adds Winther.

A month before the summit, scientists here were dubious about a deal.

"I don't expect them to come up with a solution. It's really too complex", believes Edmond Hansen.

In any case, Norwegian environmental groups will flood Copenhagen to push for concrete commitments. Orjan Holm, vice-president of the "Green warriors of Norway", plans to sail there on a giant catamaran decorated with killer whales.

"Most people in Tromso would be glad to have milder winters," says the bearded Norwegian, proudly showing off his seal skin jacket.

"But when they can't skate any more they will understand what's going on." - AFP

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7. Antarctica Glacier Retreat Creates New Carbon Dioxide Store; Has Beneficial Impact On Climate Change

ScienceDaily
November 10, 2009

Large blooms of tiny marine plants called phytoplankton are flourishing in areas of open water left exposed by the recent and rapid melting of ice shelves and glaciers around the Antarctic Peninsula. This remarkable colonisation is having a beneficial impact on climate change. As the blooms die back phytoplankton sinks to the sea-bed where it can store carbon for thousands or millions of years.

Reporting recently in the journal *Global Change Biology*, scientists from British Antarctic Survey (BAS) estimate that this new natural 'sink' is taking an estimated 3.5 million tonnes* of carbon from the ocean and atmosphere each year.

Lead author, Professor Lloyd Peck from BAS says, "Although this is a small amount of carbon compared to global emissions of greenhouse gases in the atmosphere it is nevertheless an important discovery. It shows nature's ability to thrive in the face of adversity. We need to factor this natural carbon-absorption into our

calculations and models to predict future climate change. So far we don't know if we will see more events like this around the rest of Antarctica's coast but it's something we'll be keeping a close eye on."

Professor Peck and his colleagues compared records of coastal glacial retreat with records of the amount of chlorophyll (green plant pigment essential for photosynthesis) in the ocean. They found that over the past 50 years, melting ice has opened up at least 24,000 km² of new open water (an area similar to the size of Wales) -- and this has been colonised by carbon-absorbing phytoplankton. According to the authors this new bloom is the second largest factor acting against climate change so far discovered on Earth (the largest is new forest growth on land in the Arctic).

Professor Peck continues, "Elsewhere in the world human activity is undermining the ability of oceans and marine ecosystems to capture and store carbon. At present, there is little change in ice shelves and coastal glaciers away from the Antarctic Peninsula, but if more Antarctic ice is lost as a result of climate change then these new blooms have the potential to be a significant biological sink for carbon."

Phytoplankton use chlorophyll and other pigments to absorb sunlight for photosynthesis, and when they grow in large numbers, they change the way the ocean surface reflects sunlight. They are eaten by krill and are the foundation of the ocean food web. Animals such as sponges and corals also consume phytoplankton. They can live for decades to hundreds of years and when they die they form mats on the seabed that are buried under sedimentation.

*The 3.5 million tonnes of carbon taken from the ocean and atmosphere is equivalent to 12.8 million tonnes of CO₂.

Global carbon dioxide emissions from fossil fuel combustion and land use change reached 8.7 billion tonnes of carbon in 2007.

Sea ice loss and retreat of coastal glaciers on the Antarctic Peninsula were studied using historical accounts, aerial photographs and satellite images. This shows that seven of the major ice shelves and 87% of the 244 marine glaciers have retreated over the past 50 years.

The 24,000 km² of new open water is approximately the size of Vermont, New Hampshire, New Jersey, Belize or Israel.

Definitions:

A glacier -- is a 'river of ice' that is fed by the accumulation of snow. Glaciers drain ice from the mountains to lower levels, where the ice either melts, breaks away into the sea as icebergs, or feeds into an ice shelf.

Ice sheet -- is the huge mass of ice, up to 4km thick that covers bedrock in Antarctica or Greenland. It flows from the centre of the continent towards the coast where it feeds ice shelves.

Ice shelf -- is the floating extension of the grounded ice sheet. It is composed of freshwater ice that originally fell as snow, either in situ or inland and brought to the ice shelf by glaciers. As they are already floating, any disintegration will have no impact on sea level. Sea level will rise only if the ice held back by the ice shelf flows more quickly onto the sea.

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8. Controversial new climate change results

University of Bristol
November 9, 2009

New data show that the balance between the airborne and the absorbed fraction of carbon dioxide has stayed approximately constant since 1850, despite emissions of carbon dioxide having risen from about 2 billion tons a year in 1850 to 35 billion tons a year now.

This suggests that terrestrial ecosystems and the oceans have a much greater capacity to absorb CO₂ than had been previously expected. The results run contrary to a significant body of recent research which expects that the capacity of terrestrial ecosystems and the oceans to absorb CO₂ should start to diminish as CO₂ emissions increase, letting greenhouse gas levels skyrocket. Dr Wolfgang Knorr at the University of Bristol found that in fact the trend in the airborne fraction since 1850 has only been $0.7 \pm 1.4\%$ per decade, which is essentially zero.

The strength of the new study, published online in Geophysical Research Letters, is that it rests solely on measurements and statistical data, including historical records extracted from Antarctic ice, and does not rely on computations with complex climate models.

This work is extremely important for climate change policy, because emission targets to be negotiated at the United Nations Climate Change Conference in Copenhagen early next month have been based on projections that have a carbon free sink of already factored in. Some researchers have cautioned against this approach, pointing at evidence that suggests the sink has already started to decrease.

So is this good news for climate negotiations in Copenhagen? "Not necessarily", says Knorr. "Like all studies of this kind, there are uncertainties in the data, so rather than relying on Nature to provide a free service, soaking up our waste carbon, we need to ascertain why the proportion being absorbed has not changed".

Another result of the study is that emissions from deforestation might have been overestimated by between 18 and 75 per cent. This would agree with results published last week in Nature Geoscience by a team led by Guido van der Werf from VU University Amsterdam. They re-visited deforestation data and concluded that emissions have been overestimated by at least a factor of two.

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*The next Update from the Northern Climate ExChange will be sent out **Thursday, November 18, 2009***