

Northern Climate ExChange

Independent Information - Shared Understanding - Action on Climate Change

NCE Update November 4, 2009

Article Headlines:

- [1. Multiyear Arctic ice is effectively gone: expert](#)
- [2. Plan to protect polar bears' icy habitat](#)
- [3. New initiative for climate research](#)
- [4. Kilimanjaro's snows melt away in dramatic evidence of climate change](#)
- [5. Arctic Sea Ice News: Warm winds slow autumn ice growth](#)
- [6. NOAA Scientists Fly to the Ends of the Earth to Measure Greenhouse Gases](#)
- [7. Interactions with Aerosols Boost Warming Potential of Some Gases](#)
- [8. Psychologists argue behaviour change can help halt climate change](#)

Quick Links

[NCE Website](#)
[What's New](#)
[About NCE](#)
[Climate Change North Website](#)
[Impacts & Adaptation](#)

Distribution List

[Join Our Mailing List!](#)

Announcements

- 1. Nature Reports Climate Change - Published Online November 3, 2009. doi:10.1038/climate.2009.113**

"In this issue, **Nature Reports Climate Change** looks at the UN summit from the perspective of researchers who study cooperation (see page 130), some of whom argue that trying to get an effective multi-faceted treaty agreed between 192 nations is a waste of time. Many behavioural economists say - and common sense dictates - that a strong agreement would be more easily negotiated between fewer parties."

[Download free digital of current issue here.](#)

www.nature.com

- 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. Exploration of Two Canadian Greenhouse Gas Emissions Targets:
25% Below 1990 and 20% Below 2006 Levels by 202e**

Matthew Bramley, David Suzuki Foundation - Oct 29, 2009

M. K. Jaccard and Associates reviewed the feasibility and cost of two levels of greenhouse gas emissions reduction in Canada for the David Suzuki Foundation and the Pembina Institute. The first is a 25% reduction in GHG emissions below 1990 levels by 2020; the second is compliance with the Canadian government's announced commitment to a 20% reduction of GHG from 2006 levels by 2020.

[Download report \(pdf\).](#)

www.pembina.org

**4. Climate Leadership, Economic Prosperity: Final Report on an
Economic Study of Greenhouse Gas Targets and Policies for Canada**

Matthew Bramley, David Suzuki Foundation - October 29, 2009

Climate Leadership, Economic Prosperity is the first Canadian study of its kind to show regional impacts on employment and gross domestic product, and the first to comprehensively examine how Canada can meet a greenhouse gas reduction target for 2020 that goes beyond the federal government's target.

This summary report is based on a modelling study conducted by M. K. Jaccard and Associates.

[Download full report \(pdf\)](#)

www.pembina.org

**5. 'Psychology and Global Climate Change: Addressing a Multi-
faceted Phenomenon and Set of Challenges'. *A Report of the American Psychological Association Task Force on the Interface Between Psychology and Global Climate Change.***

The APA Task Force on the Interface Between Psychology and Global Climate Change met in 2008-2009 to examine the role of psychology in understanding and addressing global climate change, including efforts to adapt to and mitigate climate change.

The task force's report reviews a wide range of research and practice relevant to climate change, including work in environmental and conservation psychology, studies of human responses to natural and technological disasters, efforts to encourage environmentally responsible behavior, and research on the psychosocial impacts of climate change.

[Download full report](#)

www.apa.org

Articles

1. Multiyear Arctic ice is effectively gone: expert

By David Ljunggren
Reuters
October 29, 2009

OTTAWA (Reuters) - The multiyear ice covering the Arctic Ocean has effectively vanished, a startling development that will make it easier to open up polar shipping routes, an Arctic expert said on Thursday.

Vast sheets of impenetrable multiyear ice, which can reach up to 80 meters (260 feet) thick, have for centuries blocked the path of ships seeking a quick short cut through the fabled Northwest Passage from the Atlantic to the Pacific. They also ruled out the idea of sailing across the top of the world.

But David Barber, Canada's Research Chair in Arctic System Science at the University of Manitoba, said the ice was melting at an extraordinarily fast rate.

"We are almost out of multiyear sea ice in the northern hemisphere," he said in a presentation in Parliament. The little that remains is jammed up against Canada's Arctic archipelago, far from potential shipping routes.

Scientists link higher Arctic temperatures and melting sea ice to the greenhouse gas emissions blamed for global warming.

Barber spoke shortly after returning from an expedition that sought -- and largely failed to find -- a huge multiyear ice pack that should have been in the Beaufort Sea off the Canadian coastal town of Tuktoyaktuk.

Instead, his ice breaker found hundreds of miles of what he called "rotten ice" -- 50-cm (20-inch) thin layers of fresh ice covering small chunks of older ice.

"I've never seen anything like this in my 30 years of working in the high Arctic ... it was very dramatic," he said.

"From a practical perspective, if you want to ship across the pole, you're concerned about multiyear sea ice. You're not concerned about this rotten stuff we were doing 13 knots through. It's easy to navigate through."

Scientists have fretted for decades about the pace at which the Arctic ice sheets are shrinking. U.S. data shows the 2009 ice cover was the third-lowest on record, after 2007 and 2008.

An increasing number of experts feel the North Pole will be ice free in summer by 2030 at the latest, for the first time in a million years.

"I would argue that, from a practical perspective, we almost have a seasonally ice-free Arctic now, because multiyear sea ice is the barrier to the use and development of the Arctic," said Barber.

Fresh first-year ice always forms in the Arctic in the winter, when temperatures plunge far below freezing and the North Pole is not exposed to the sun.

Shipping companies are already looking to benefit from warming waters. This year two German cargo ships successfully navigated from South Korea along Russia's northern Siberia coast without the help of icebreakers.

The Arctic is warming up three times more quickly than the rest of the Earth, in part because of the reflectivity, or the albedo feedback effect, of ice.

As more and more ice melts, larger expanses of darker sea water are exposed. These absorb more sunlight than the ice and cause the water to heat up more quickly, thereby melting more ice.

Barber said the ice was now being melted both by rays from the sun as well as from below by the warmer water.

Scientists are also seeing more cyclones, which pick up force as they absorb heat from the warmer water. The cyclones help generate waves that break up ice sheets and also dump large amounts of snow, which has an insulating effect and prevents the ice sheets from thickening.

After a long search, Barber's ice breaker finally found a 16-km (10-mile) wide floe of multiyear ice that was around 6 to 8 meters (20-26 feet) thick. But as the crew watched, the floe was hit by a series of waves, and disintegrated in five minutes.

"The Arctic is an early indicator of what we can expect at the global scale as we move through the next few decades ... So we should be paying attention to this very carefully," Barber said.

(editing by Rob Wilson)

www.reuters.com

[back to top](#)

2. Plan to protect polar bears' icy habitat

NewScientist
October 28, 2009

A plan to designate 500,000 square kilometres of Alaska's northern coast as "critical habitat" for polar bears may be too little too late.

The US Department of the Interior has proposed the designation for the entire range of the country's Chukchi Sea and Southern Beaufort Sea populations - approximately 2500 bears in total. The protected area would include the bears' sea ice habitat, as well as barrier islands and spits along Alaska's coast, and surrounding water to a depth of 300 metres.

While the zone would not amount to a full conservation area, it would require federal agencies to ensure that oil and gas exploration do not further jeopardise the polar bears' habitat.

"The designation of critical habitat is a necessary and appropriate step to assist polar bears," says Andrew Derocher, who recently stepped down as chair of the IUCN Polar Bear Specialist Group. But cordoning off the bears' habitat without cutting the greenhouse gas emissions that are behind the sea ice's melting will fail to protect the bears, he adds. "It does not address the underlying threat to the species, which is habitat loss associated with global warming."

Pressing threat

This threat is pressing, says Derocher, now at the University of Alberta in Edmonton, Canada. "The Southern Beaufort Sea population is not expected to persist beyond mid-century if the ongoing changes in sea ice continue and if the ice conditions change as predicted by ice models."

He also points to growing evidence of the effects of climate change in polar bear populations, such as increased death rates, drowning, cannibalism and fasting.

Though the outlook in Alaska is uncertain, the bears are expected to survive elsewhere, for a while at least. Despite global warming, suitable habitat is expected to persist for the rest of the century north of the Canadian Arctic archipelago and Greenland (see [We still have a chance to save polar bears](#)).

A 60-day public consultation on the proposed designation is now underway, and extra scientific and economic studies on its impact are planned. A final ruling is expected by next June.

www.newscientist.com

[back to top](#)

3. New initiative for climate research - Eight Research Centres of the Helmholtz Association focus their competences in exploring the regional climate

Alfred Wegener Institute
October 28, 2009

The earth is currently subject to profound climate change. However, the effects can regionally be highly different. How will global changes impact in detail on the regional scale? In which way will anthropogenic influence and natural climate change affect each other? On which knowledge base can regions react to the expected changes by means of appropriate climate adaptation and mitigation strategies?

Eight research centres of the Helmholtz Association focus their competences in the Helmholtz network Regional Climate Change ("Regionale Klimaänderungen": REKLIM) to answer questions of this kind. The network is equipped with a budget of 32.2 million Euros during the years 2009 to 2013.

Interactions between atmosphere, ice, oceans and land surfaces determine the Earth's climate. Recent global climate models were very helpful in creating a first understanding of large-scale natural climate fluctuations and human impacts on the climate. Many processes, which influence the climate on various scales, however, are not well enough understood.

There is currently a general consensus in the scientific community that the current global warming of the Earth can mainly be attributed with a high probability to increased concentrations of greenhouse gases and altered land use. Detailed impacts on specific regions are so far not completely understood. Whether climate change causes, for example, summers to be dryer or winters to be wetter is scientifically not sufficiently clear for all regions, but is crucial for agricultural use.

"For political and economic decision-making, detailed scenarios regarding for example the increasing sea level are important to adapt coastal protection measures accordingly", says Prof. Dr. Jürgen Mlynek, President of the Helmholtz Association, underlining the social relevance of regional climate scenarios.

Headed by Prof. Dr. Peter Lemke from the Alfred Wegener Institute for Polar and Marine Research, eight research centres of the Helmholtz Association have joined together in the network REKLIM, which tries to find answers to the following questions:

- In which way is the development of our climate dependent on the interaction between atmosphere, ice, oceans and land surfaces, and how does human influence affect natural climate fluctuations?
- How large is the loss of continental ice masses (particularly on Greenland) and how does the sea level react to melt water and warming?
- What are the causes of the large changes in Arctic sea ice and permafrost and what are the local impacts and the teleconnections?
- Which consequences from climate change do we have to expect for ecosystems, water resources or agriculture and forestry in Germany and the Alpine region?
- In which way will the regional climate be affected by changing atmospheric composition? In which way will extreme weather events like storms, floods and droughts be altered by climate change?
- How can we choose an optimal path for adaptation and mitigation measures?

To answer these questions, the researchers from the eight centres will improve the database for their model computations. This will be the only way to produce high-resolution analyses and scenarios.

"Detailed observations and process studies are used to develop optimized coupled climate models that will show us the regional and local imprints of the changing global climate system", explains Lemke.

This way, the researchers will be able to give better advice to policy makers, business, administration and the public at large with scientifically founded data and scenarios for decisions concerning regional development.

"The participating Helmholtz centres work in various scientific disciplines. We will expand and combine our excellent expert knowledge in a result-oriented manner in REKLIM to facilitate well-founded decision-making processes on how regions will adapt to climate change or how to avoid it", the climate scientist continues.

The following Helmholtz centres are participating in the Helmholtz network REKLIM: the Alfred Wegener Institute for Polar and Marine Research, the Institute of Meteorology and Climate Research in Karlsruhe Institute of Technology, the GKSS Research Centre Geesthacht, the Research Centre Jülich, the Helmholtz Centre Potsdam - GFZ German Research Centre for Geosciences, the Helmholtz Centre Munich - German Research Centre for Environmental Health, the Helmholtz Centre for Environmental Research - UFZ, and the German Aerospace Centre - DLR.

www.awi.de

[back to top](#)

4. Kilimanjaro's snows melt away in dramatic evidence of climate change

By Hannah Devlin
The Times
November 3, 2009

The snows of Mount Kilimanjaro will be gone within two decades, according to scientists who say that the rapid melting of its glacier cap over the past century provides dramatic physical evidence of global climate change.

If the forecast - based on 95 years of data tracking the retreat of the Kilimanjaro ice - proves correct it will be the first time in about 12,000 years that the slopes of Africa's highest mountain have been ice-free.

Since 1912, 85 per cent of the glacier has disappeared and the melting does not appear to be slowing down. Twenty-six per cent of the ice has disappeared since 2000.

The study, published today in the journal Proceedings of the National Academy of Sciences, concludes that the primary cause of the ice loss is the increase in global temperatures. Although changes in cloudiness and snowfall may also play a role, these factors appear to be less important. Even intense droughts, including one lasting about 300 years, did not cause the present degree of melting.

The study, based on terrestrial and satellite photographs, shows the shrinking contours of ice at points between 1912 and 2007. The 12 sq km (4.6 sq miles) of ice coverage in 1912 contracted to 1.9 sq km by 2007, going from two large ice fields to a collection of several smaller, isolated patches.

In a second part of the study, scientists from the Ohio State University drilled down to the rock beneath the ice and extracted cylindrical crosssections, known as ice cores, at six different sites on the glacier. The cores, which were up to 49m (160ft) long, provided a record of the freezing, melting and precipitation patterns of the past 11,700 years.

Elongated bubbles in the surface layer of one of the cores indicated that extensive melting and refreezing had taken place in the past 40 years. In the past even extreme climate events had not led to substantial melting. A severe drought 4,200 years ago lasting three centuries left a 1in dust layer but no evidence of significant melting.

Radioactive dating techniques also showed that the ice was quickly thinning, as well as contracting in area. The Southern Ice Field had thinned by 5.1m between 2000 and 2007, and the smaller Furtwängler Glacier had thinned by 4.8m - 50 per cent of its total depth.

"There will be a year when Furtwängler is present, and, by the next year, it will have disappeared," Lonnie Thompson, a paleoclimatologist at Ohio State University who led the study, said.

The melting of Kilimanjaro is part of a trend of glacial retreat throughout Africa, India and South America. Melting is occurring on Mount Kenya, the Rwenzori Mountains in central Africa, as well as on tropical glaciers high in the Andes and Himalayas.

"The fact that so many glaciers throughout the tropics and subtropics are showing similar responses suggests an underlying common cause," Professor Thompson said.

He attributed the changes to increases in the Earth's surface temperatures, which are exaggerated at high altitudes. Scientists predict that, even if no further significant warming occurs, all but the very highest of summits will eventually melt.

The melting of glaciers can be devastating for species who rely on snowy environments for survival. It can also have consequences for agriculture. Much of the river flow in glacial regions comes from melt water and glacial retreat is predicted to increase water scarcity.

The Met Office predicted this month that glacial retreats could lead to a 20 per cent decline in global agricultural productivity.

www.timesonline.co.uk

[back to top](#)

5. Arctic Sea Ice News: Warm winds slow autumn ice growth

NSIDC

November 3, 2009

Sea ice extent grew throughout October, as the temperature dropped and darkness returned to the Arctic. However, a period of relatively slow ice growth early in the month kept the average ice extent low-October 2009 had the second-lowest ice extent for the month over the 1979 to 2009 period.

Overview of conditions

Sea ice extent averaged over October 2009 was 7.50 square kilometers (2.90 square miles). This was 1.79 million square kilometers (691,000 square miles) below the 1979 to 2000 mean for October, but 730,000 square kilometers (282,000 square miles) above the record low for the month, which occurred in October 2007. [Figure 1](#)

Conditions in context

In the fall, cold conditions and polar darkness return to the Arctic. As is typical for this time of year, ice growth was brisk in October, growing at an average 96,000 square kilometers per day (37,000 square miles per day).

However, the growth rate slowed for a time in early October, coinciding with strong winds from the south over central Siberia. The winds helped prevent ice from forming along the Siberian coast. At the end of the month, extensive areas of open water regions were still present in the northernmost North Atlantic, and north of Alaska. The ice edge was north of both Svalbard and Franz Josef Land. [Figure 2](#)

October 2009 compared to past years

The period of slow ice growth at the beginning of the month helped to keep October average ice extent low. Arctic sea ice extent was 950,000 square kilometers (367,000 square miles) below October 2005 and 890,000 square kilometers (340,000 square miles) below that measured in 2008. Although ice extent for October 2009 was 730,000 square kilometers (282,000 square miles) above the record low for the month in

2007, it steepened the linear trend for October slightly to -5.9 % per decade. [Figure 3](#)

A warm October

For most of the month, a high-pressure system sat over the Beaufort Sea, while unusually low pressure dominated the Barents Sea. In accord with [Buys Ballot's Law](#), the area between the two pressure centers saw strong, warm winds blowing from the south. This wind pattern, in conjunction with extensive open water, led to a mean monthly temperature as high as 6 degrees Celsius (11 degrees Fahrenheit) above average in the region between the high and low pressure anomalies ([October air temperature map](#)).

[Figure 4](#)

Declining sea ice extent and Arctic storms

A new study by Ian Simmonds and Kevin Keay, at the University of Melbourne in Australia, finds connections between the decline in September sea ice extent and the characteristics of Arctic storms. As ice extent has decreased, Arctic storms have shown a tendency to become more intense, especially in the last few years. The study suggests that low September ice extent, with extensive areas of open water, provides more energy to autumn storms, allowing them to become stronger. The stronger storms also help to break up the ice.

Related research at NSIDC reveals that when September ice extent is unusually low, precipitation linked to Arctic storms tends to be greater than when September ice extent is unusually high (Figure 5). Climate scientists are interested in these studies, because increased autumn snowfall could have effects on both sea ice and permafrost in the Arctic.

[Figure 5](#)

www.nsidc.org

[back to top](#)

6. NOAA Scientists Fly to the Ends of the Earth to Measure Greenhouse Gases

NOAA

November 2, 2009

Broomfield, Colo. - NOAA scientists took off Saturday on the second phase of a mission that, when complete, will provide a detailed view of how carbon dioxide and other greenhouse gases are distributed globally. Monitoring the increasing levels of greenhouse gases and black carbon aerosols in the atmosphere is crucial to understanding human-caused climate change.

"Missions such as this one are critical to understanding the impacts of greenhouse gases and particulates," said Jane Lubchenco, Ph.D., under secretary of commerce for oceans and atmosphere and NOAA administrator. "The data collected are also essential to help verify if policies to reduce these heat trapping pollutants are having their intended effect."

Fred Moore and Ryan Spackman, researchers from NOAA's Cooperative Institute for Research in Environmental Sciences (CIRES), took off early Saturday with five NOAA Earth System Research Laboratory (ESRL) instruments on a modified Gulfstream aircraft. Their roller-coaster tour of the planet will take them from pole to pole, dipping and climbing repeatedly between altitudes of 1,000 feet and 47,000 feet. ESRL and CIRES, a joint institute of the University of Colorado and NOAA, are located in Boulder, Colo.

Their flights, planned to continue through December, are part of the HIPPO Mission, a multiagency, multiyear effort to paint a three-dimensional portrait of the atmosphere. HIPPO, for HIAPER Pole-to-Pole Observations of Greenhouse Gases, is funded and operated jointly by the National Science Foundation, the National Center for Atmospheric Research, and NOAA. HIAPER - the High-performance Instrumented Airborne Platform - is the NSF's Gulfstream V aircraft.

Steve Wofsy of Harvard University is leading HIPPO with a team of scientists from NOAA, NCAR, Scripps

Institution of Oceanography, Jet Propulsion Laboratory, University of Miami, and Princeton University.

"While we have ground-based stations that measure carbon dioxide at specific locations, HIPPO is giving us a view of how carbon dioxide is distributed globally at different altitudes and during different seasons," said Jim Elkins, Ph.D., a NOAA ESRL atmospheric physicist. The team is pleased with the success of the first phase of HIPPO flights last January, which gathered data in cross-sections of the atmosphere from pole to pole, he said.

Information gathered during these flights will be critical for both climate modelers seeking to understand Earth's future and policymakers who rely on accurate science for decision-making. This research and decades of greenhouse gas monitoring are part of NOAA's suite of climate services.

Three more sets of flights are planned over the next two years to fill in additional data during different seasons and from areas where few previous measurements have been made. HIPPO's second phase will cover the central and eastern Pacific, departing from Colorado with stops in Alaska, Hawaii, Rarotonga of the Cook Islands, New Zealand, Australia, and the Solomon Islands. A fly-over of the NOAA American Samoa observatory is also planned.

NOAA scientists have been monitoring greenhouse gases through a ground-based, global network for nearly 40 years. As these gases move up through different layers of the atmosphere, they may persist for a time or be altered or destroyed in the upper atmosphere. The HIPPO Mission flights will give scientists a clearer picture of the distribution of greenhouse gases throughout the atmosphere.

NOAA scientists designed five instruments for analyzing air samples onboard HIPPO flights. They have the ability to detect and measure more than 30 major and minor greenhouse gases as well as water vapor, ozone, and soot particles.

"We are providing flight planning and weather support, measurements of all greenhouse gases and some carbon isotopes, and in-flight measurement of non-carbon dioxide greenhouse gases and black carbon," Elkins said.

Eric Hintsa of CIRES and Elkins will be flying on subsequent legs of HIPPO phase II. Other scientists involved in leadership, flight planning and overall coordination on the ground are Steven Montzka, David Fahey, Ru-shan Gao, and Karen Rosenlof of NOAA, and Geoff Dutton, Molly Heller, Ben Miller, J. David Nance, Eric Ray, Joshua Schwarz, Colm Sweeney, Jack Higgs, and Sonja Wolter of CIRES.

NOAA understands and predicts changes in the Earth's environment, from the depths of the ocean to the surface of the sun, and conserves and manages our coastal and marine resources.

www.noaanews.noaa.gov

[back to top](#)

7. Interactions with Aerosols Boost Warming Potential of Some Gases

Adam Voiland
NASA
October 29, 2009

For decades, climate scientists have worked to identify and measure key substances -- notably greenhouse gases and aerosol particles -- that affect Earth's climate. And they've been aided by ever more sophisticated computer models that make estimating the relative impact of each type of pollutant more reliable.

Yet the complexity of nature -- and the models used to quantify it -- continues to serve up surprises. The most recent? Certain gases that cause warming are so closely linked with the production of aerosols that the emissions of one type of pollutant can indirectly affect the quantity of the other. And for two key gases that cause warming, these so-called "gas-aerosol interactions" can amplify their impact.

"We've known for years that methane and carbon monoxide have a warming effect," said Drew Shindell, a climate scientist at the NASA Goddard Institute for Space Studies (GISS) in New York and lead author of a study published this week in *Science*. "But our new findings suggest these gases have a significantly more powerful warming impact than previously thought."

Mixing a Chemical Soup

When vehicles, factories, landfills, and livestock emit methane and carbon monoxide into the atmosphere, they are doing more than just increasing their atmospheric concentrations. The release of these gases also have indirect effects on a variety of other atmospheric constituents, including reducing the production of particles called aerosols that can influence both the climate and the air quality. These two gases, as well as others, are part of a complicated cascade of chemical reactions that features competition with aerosols for highly reactive molecules that cleanse the air of pollutants.

Aerosols can have either a warming or cooling effect, depending on their composition, but the two aerosol types that Shindell modeled -- sulfates and nitrates -- scatter incoming light and affect clouds in ways that cool Earth. They are also related to the formation of acid rain and can cause respiratory distress and other health problems for those who breathe them.

Human activity is a major source of sulfate aerosols, but smokestacks don't emit sulfate particles directly. Rather, coal power production and other industrial processes release sulfur dioxide -- the same gas that billows from volcanoes -- that later reacts with atmospheric molecules called hydroxyl radicals to produce sulfates as a byproduct. Hydroxyl is so reactive scientists consider it an atmospheric "detergent" or "scrubber" because it cleanses the atmosphere of many types of pollution.

In the chemical soup of the lower atmosphere, however, sulfur dioxide isn't the only substance interacting with hydroxyl. Similar reactions influence the creation of nitrate aerosols. And hydroxyls drive long chains of reactions involving other common gases, including ozone.

Methane and carbon monoxide use up hydroxyl that would otherwise produce sulfate, thereby reducing the concentration of sulfate aerosols. It's a seemingly minor change, but it makes a difference to the climate. "More methane means less hydroxyl, less sulfate, and more warming," Shindell explained.

His team's modeling experiment, one of the first to rigorously quantify the impact of gas-aerosol interactions on both climate and air quality, showed that increases in global methane emissions have caused a 26 percent decrease in hydroxyl and an 11 percent decrease in the number concentration of sulfate particles. Reducing sulfate unmasks methane's warming by 20 to 40 percent over current estimates, but also helps reduce negative health effects from sulfate aerosols.

In comparison, the model calculated that global carbon monoxide emissions have caused a 13 percent reduction in hydroxyl and 9 percent reduction in sulfate aerosols.

Nitrogen oxides -- pollutants produced largely by power plants, trucks, and cars -- led to overall cooling when their effects on aerosol particles are included, said Nadine Unger, another coauthor on the paper and a climate scientist at GISS. That's noteworthy because nitrogen oxides have primarily been associated with ozone formation and warming in the past.

A New Approach

To determine the climate impact of particular greenhouse gases, scientists have traditionally relied on surface stations and satellites to measure the concentration of each gas in the air. Then, they have extrapolated such measurements to arrive at a global estimate.

The drawback to that "abundance-based approach," explained Gavin Schmidt, another GISS climate scientist and coauthor of the study, is that it doesn't account for the constant interactions that occur between various atmospheric constituents. Nor is it easy to parse out whether pollutants have human or natural origins.

"You get a much more accurate picture of how human emissions are impacting the climate -- and how policy makers might effectively counteract climate change -- if you look at what's emitted at the surface

rather than what ends up in the atmosphere," said Shindell, who used this "emissions-based" approach as the groundwork for this modeling project.

However, the abundance-based approach serves as the foundation of key international climate treaties, such as the Kyoto Protocol or the carbon dioxide cap-and-trade plans being discussed among policymakers. Such treaties underestimate the contributions of methane and carbon monoxide to global warming, Shindell said.

Unpacking the Implications

According to Shindell, the new findings underscore the importance of devising multi-pronged strategies to address climate change rather than focusing exclusively on carbon dioxide. "Our calculations suggest that all the non-carbon dioxide greenhouse gases together have a net impact that rivals the warming caused by carbon dioxide."

In particular, the study reinforces the idea that proposals to reduce methane may be an easier place for policy makers to start climate change agreements. "Since we already know how to capture methane from animals, landfills, and sewage treatment plants at fairly low cost, targeting methane makes sense," said Michael MacCracken, chief scientist for the Climate Institute in Washington, D.C.

This research also provides regulators insight into how certain pollution mitigation strategies might simultaneously affect climate and air quality. Reductions of carbon monoxide, for example, would have positive effects for both climate and the public's health, while reducing nitrogen oxide could have a positive impact on health but a negative impact on the climate.

"The bottom line is that the chemistry of the atmosphere can get hideously complicated," said Schmidt. "Sorting out what affects climate and what affects air quality isn't simple, but we're making progress."

www.nasa.gov

[back to top](#)

8. Psychologists argue behaviour change can help halt climate change

British Psychological Society
October 27, 2009

Tackling misconceptions and changing our behaviour are just some of the ways that psychology can help shape climate-change policy. These and other issues are discussed today, 27 October, at a one day conference at the Royal Society of Arts, London, in conjunction with the British Psychological Society.

The keynote presentation will be given by Professor Paul Stern, Director of the Committee on the Human Dimensions of Global Change of the U.S. National Academies of Science.

This will be followed by presentations on three influential UK psychology research projects which are currently informing policymakers on climate-change and sustainability issues.

- **Resolve: Lifestyles Values and Environment** - Dr Birgitta Gatersleben, University of Surrey
 - **Public Perceptions of Climate Change and Energy Futures in Britain** - Professor Nick Pidgeon, University of Cardiff & BPS climate change working party
 - **Beyond Nimbyism: A multidisciplinary investigation of public engagement with renewable energy technologies** - Dr Patrick Devine-Wright, University of Exeter
- A panel of leading experts will participate in a question and answer session.

Key policy makers and influential government advisers will attend this invite-only event. Places are available for press on request. Registration starts at 10am and lunch will be provided.

Professor David Uzzell, Chair of the British Psychological Society's Climate Change working party said 'The UK Government has set extremely challenging targets for the reduction of carbon emissions and the

forthcoming United Nations climate change conference in Copenhagen in December may set even higher targets.

Technological innovations will obviously play a major role in reaching these targets. But it is clear that changes in values, norms, attitudes and behaviours will also be essential - not only to reduce energy demand in the domestic and transport sectors, but also to ensure public acceptability and uptake of technological innovations as well as climate adaptation measures.'

'Many disciplines are contributing to Government and international climate-change policies and initiatives. Psychologists, who have been researching areas of human behaviour vital to tackling and adapting to climate change for over a century, have much to contribute to this debate.'

For further information please contact the Media Centre on 0116 252 9500 or email mediacentre@bps.org.uk

www.bps.org.uk

[back to top](#)

NCE Update Subscribers,

For comments, or to submit content you would like considered for inclusion in the NCE Update, e-mail us at: [NCE Update](#).

Northern Climate ExChange

[back to top](#)

*The next Update from the Northern Climate ExChange will be sent out **Thursday, November 12, 2009***