BIODIVERSITY AND ECOLOGY

Pressure on primates

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Several endangered primate species could be adversely affected by climate change, finds a new study. Ruscena Wiederholt and Eric Post of Pennsylvania State University looked at whether El Niño events, in which abnormally warm surface waters in the Pacific Ocean affect the climate, could influence primate populations in the tropics. They focused their attention on four species of New World primates: the muriqui of Brazil (*Brachyteles arachnoids*), the woolly monkey (*Lagothrix lagotricha*) in Colombia, Geoffroy's spider monkey (*Ateles geoffroyi*) on Barro Colorado Island in Panama, and the red howler monkey (*Alouatta seniculus*) in Venezuela.

They found that after every event, all four of the species suffered either an immediate or a lagged decline in population. Populations of spider, woolly and muriqui monkeys, species that mostly eat fruit, were affected in the year directly following El Niño events, and suffered the largest declines. Howler monkeys, who mostly eat leaves, suffered population declines during El Niño years.

Climate change is expected to increase the frequency of El Niño events. The effects could be devastating for several species of New World monkey that are already threatened with extinction, warn the researchers.

Stephanie Baudains

ATMOSPHERIC SCIENCE

Complex connections

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The warming effects of greenhouse gases are likely to be different than currently anticipated, owing to their interactions with aerosols in the atmosphere. Although aerosols are known to cool the climate, the effect of their interactions with greenhouse gases on climate has been unknown.

Drew Shindell, of the NASA Goddard Institute for Space Studies, and colleagues used a model that couples atmospheric composition with climate to examine the impact of aerosols on the warming potential of different greenhouse gases over a 100-year period. They show that gas-aerosol interactions increase the warming potential of methane by 10 per cent, and when aerosol-cloud interactions are included, methane-induced warming increases by 20-40 per cent. A similar, even more pronounced pattern is seen for emissions of carbon monoxide. In contrast, the cooling effect of nitrogen oxides increases when interactions with sulphate aerosols are taken into account.

Although interactions between air pollutants and ecosystems — not considered in this study — are likely to modify these results, the researchers suggest that atmospheric interactions between aerosols and greenhouse gases should be accounted for when evaluating the climatic impact of emissions.

Anna Armstrong

CLIMATE IMPACTS

African ice loss

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Mount Kilimanjaro, known for its snowy cap, could be ice-free within several decades if climate change continues unabated. This stark warning comes from a new study, which shows that ice cover atop the African mountain has declined by 26 per cent since 2000.

Glaciologist Lonnie Thompson, of the Byrd Polar Research Center at Ohio State University in Columbus, and colleagues used a combination of aerial photographs and ground-based observations to study changes in ice cover on Kilimanjaro from 2000 to 2007. Their observations confirmed that, across the mountain, ice fields are shrinking in size and thinning rapidly. Analysis of an ice core from Kilimanjaro's northern ice field revealed clear evidence of surface melting in the upper 650 millimetres, a pattern not seen elsewhere in the 49-metre core. This suggests that loss of ice on the mountain is more severe now than at any time in the past 11,700 years.

The actual causes of glacier loss in the region are still under investigation. But the authors say that several lines of evidence suggest local climatological changes are insufficient to account for the observed losses. Furthermore, they note that the situation is not unique, with ice fields worldwide shrinking.

Olive Heffernan

ATMOSPHERIC SCIENCE

Unlucky strike

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Lightning storms at mid-latitudes and in the subtropics produce more nitrogen oxides (NO_x) than previously thought, finds a new study. What's more, most of the NOx pollution — a precursor to the greenhouse gas ozone — ends up in the upper troposphere, where it has a strong influence on climate.

A team led by Lesley Ott of NASA's Goddard Earth Sciences and Technology Center in Greenbelt, Maryland, used data collected during lightning storms in Germany and the United States between 1985 and 2002, along with a cloud simulation model, to estimate the amount of NO_x produced by an average flash of lightning. They found that a single lightning strike produces about 7 kilograms of chemically reactive NO_x. Worldwide, this amounts to an annual production of 8.6 million metric tonnes. As none of the data were collected in the tropics — where lightning may yield less NO_x per flash — the global estimate may be on the high end, say the researchers.

They speculate, however, that if lightning storms become more frequent in the future, as predicted by some theoretical models, increased NO_x in the upper atmosphere could affect global climate change.

Stephanie Baudains

CRYOSPHERE

In the balance

STEVE MORGAN

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Greenland, home to one-tenth of the world's land ice, is rapidly losing mass, pushing up global sea levels. Approximations of how fast this is happening vary widely, but a study now offers one estimate verified using two independent methods.

An international team led by Michiel van den Broeke at Utrecht University in the Netherlands gauged the rate at which the Greenland ice sheet is shrinking based firstly on observations of ice movement, melting and snowfall. They then compared these results with remote gravity measurements made by a pair of US–German satellites known as GRACE (the Gravity Recovery and Climate Experiment). They found that, on average, the ice sheet lost a total of about 1500 gigatons of mass between 2000 and 2008, equivalent to about 0.46 millimetres of global sea level rise per year. The loss of mass during this time was split equally between surface processes, such as melting, and the physical discharge of large chunks of ice into the ocean.

From 2006 to 2008, the rate of ice loss accelerated, mostly due to high rates of summer surface melting, reaching 273 gigatons of mass per year, or 0.75 millimetres of annual sea level rise.

Olive Heffernan

OCEAN SCIENCE

New shores for sinks

SEAWIFS, NASA & ORBIMAGE

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In areas of water newly exposed by the melting and retreat of glaciers around the Antarctica Peninsula, large blooms of phytoplankton are beginning to flourish. By sucking up carbon and transporting it to the deep sea, the blooms can act as a buffer against climate change.

A research team from the British Antarctic Survey in Cambridge, led by biologist Lloyd Peck, compared historical records of glacial retreat along the Antarctic Peninsula coastline with measurements of chlorophyll — a green photosynthetic pigment contained in the phytoplankton — from the surrounding ocean. They found that a new carbon sink has developed in the region over the past 50 years and is now taking up 3.5 million tonnes of carbon from the ocean and atmosphere each year. Of the 3.5 million tonnes of carbon absorbed annually, 0.7 million tonnes is transported to the seabed, where it can stay locked away from the atmosphere for thousands of years.

The researchers anticipate that the blooms — which now soak up as much carbon as 6000-17000 hectares of tropical rainforest — will grow as the ice continues to melt. The amount sequestered will still only be minor, however, compared to the billions of tonnes of CO_2 produced by humans each year.

Olive Heffernan