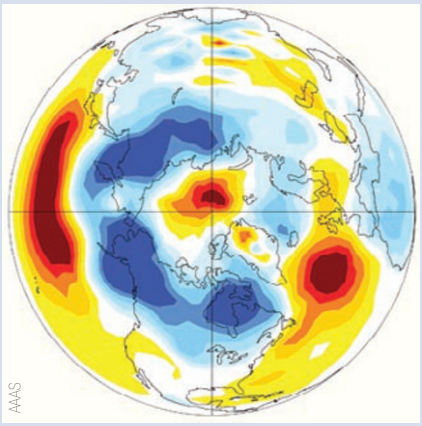
PALEOCLIMATE

Past perspective



Science **326,** 1256-1260 (2009)

Periods of relative coolness or warmth in the Earth's past can be used to garner clues about future climate change. One such episode, dubbed the Medieval Warm Period, saw a spell of mild weather in Europe from the 900s through to the 1300s and was followed by a drawn-out dip in temperature known as the Little Ice Age.

Michael Mann of Pennsylvania State University and colleagues have now analysed global surface temperature over the past 1,500 years in unprecedented spatial detail. Using more than a thousand proxy records, including tree ring, ice core, cave deposit, coral and sedimentary data, they show that the climate was not globally uniform during these anomalous events. During the Medieval Warm Period, for example, southern Greenland may have been as warm as today, but a large area covering much of the tropical Pacific was unusually cold owing to the prevalence of La Niña conditions, which cause extensive cooling of the Pacific Ocean.

The researchers conclude that regional variations in past climate were largely the result of natural factors such as volcanic activity and climatic cycles. The results may help to refine regional climate model projections, they say.

Alicia Newton

BIODIVERSITY AND ECOLOGY

Carbon offsets

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Science **326,** 1399–1354 (2009)

Scientists have long known that nitrogen pollution from sources such as fertilizer can reduce plant diversity. Now researchers have discovered that an increase in atmospheric carbon dioxide could counter this effect.

In a ten-year field experiment, Peter Reich at the University of Minnesota, Saint Paul, monitored the response of 48 open-air perennial grasslands, planted with 16 different species, to combinations of ambient and elevated soil nitrogen and atmospheric carbon dioxide concentrations. Over a decade, plant diversity in grasslands with high nitrogen levels decreased by 16 per cent with ambient CO_2, but only by 8 per cent when both nitrogen and CO_2 levels were high. The altered nitrogen and carbon dioxide regimes had significant, interactive effects on plant diversity within two years.

The results suggest that predicting the response of biodiversity to atmospheric changes may be challenging at the local level.

Olive Heffernan

OCEAN SCIENCE

Consider the lobster

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Geology **37,** 1131–1134 (2009)

The lobster is one creature that could fare better in an acidic ocean. Experimental evidence has shown that the sea's shelled inhabitants, and those with exoskeletons, could struggle to survive as CO_2 continues to invade the ocean. But in fact there will be winners and losers, finds a new study.

Justin Ries of the University of North Carolina at Chapel Hill and colleagues reared 18 species of 'marine calcifiers' for 60 days in experimental seawater tanks that had uniform temperature but varied in acidity and in the availability of the carbonate ion used by calcifiers to build their shells and skeletons. Ries and colleagues found that 10 of the 18 species were less able to build their encasings in acidic seawater than in regular seawater. For four of the species tested — limpets, purple urchins, and red and green algae — the ability to calcify improved in waters of intermediate acidity but worsened in highly acidic waters. Lobsters, crabs and shrimp, however, were unexpectedly able to build more shell as the acidity of the seawater increased.

The results suggest that the impacts of ocean acidification on marine life may be more complex than previously thought.

Olive Heffernan

BIODIVERSITY AND ECOLOGY

Aspen explosion

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Glob. Change Biol. doi:10.1111/j.1365-2486.2009.02103.x (2009)

Escalating carbon dioxide emissions have boosted the growth rate of quaking aspens — one of North America's most important deciduous trees — by a whopping 50 per cent over the past 50 years. Scientists have previously shown that CO_2 enhances aspen growth in experiments, but a new study is the first to show that aspens are responding to the greenhouse gas in their native environment.

Christopher Cole of the University of Minnesota at Morris and colleagues measured the growth rates of 919 individual aspen in Wisconsin forests. The growth rate