CRYOSPHERE

Accelerating ice loss

JOE MASTROIANNI

Nature Geosci. doi:10.1038/ngeo102 (2008)
Ice is being lost from vast portions of the West Antarctic Ice Sheet that previously seemed protected from extensive melting. Until now, large-scale ice loss from the continent had been detected only on a narrow peninsula that has warmed rapidly over the past decade.

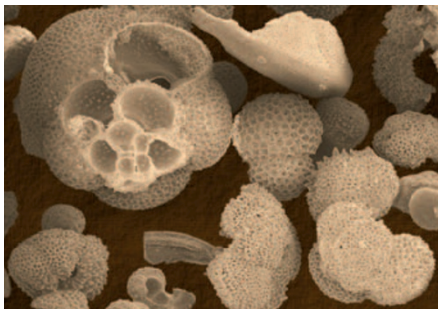
Eric Rignot at the University of California, Irvine and co-workers measured the amount of ice released into the ocean from Antarctic glaciers by mapping 85 percent of the coastline using European, Japanese and Canadian satellite radar data. They discovered a 75 percent increase in the glacial discharge of ice into the ocean from parts of West Antarctica in the past ten years, despite land temperatures remaining fairly stable. East Antarctica showed fewer losses, although the researchers noted thinning of the ice sheet in potentially unstable areas. They found little change in the accumulation of snowfall on Antarctica over the same period.

Escalating ice loss may be caused by warming of the oceans surrounding Antarctica. The relatively warm Antarctic Circumpolar Current has been migrating southward in recent decades, reaching the edges of the continent and destabilizing the ice shelves. The rapid retreat of the Antarctic ice sheet shows no sign of abating and could lead to greater rises in sea level than currently predicted.

Alicia Newton

PALEOCLIMATE

Greenhouse glaciers



ERIC CONDLIFFE

Science **319**, 189–192 (2008)
Massive glaciers, up to 60 percent of the size of the present-day Antarctic ice cap, may have existed during one of the warmest episodes on Earth. The Turonian period, 93.5 to 89.3 million years ago, when tropical sea surface temperatures were over 35 °C and alligators roamed the Arctic, was previously assumed to be ice-free.

But now a multinational team of scientists led by André Bornemann, then of Scripps Institution of Oceanography at the University of San Diego, has uncovered clues from the sea floor off Suriname in South America that challenge this supposition. Two separate lines of evidence point to widespread glaciation that lasted around 200,000 years during the 'super greenhouse' period. The first piece of the puzzle was garnered from chemical traces in the fossil shells of single-celled foraminifera recovered from deep-sea sediments. Combining the fossil evidence with an analysis of organic molecules in the same sediments, the team found past ocean temperature and chemical changes consistent with historic glacier formation.

The study suggests that ice growth occurred even during the hottest periods on Earth. But the researchers warn that this does not imply the same will hold in the future greenhouse world, as warming is now happening much more rapidly.

Olive Heffernan

BIODIVERSITY AND ECOLOGY

Predictions on the wing

EMILY THRELKELD

Glob. Change Biol. doi:10.111/j.1365-2486.2007.01488.x (2007)
Migrating birds preparing to depart sub-Saharan Africa may use local temperatures to predict the weather at their European destinations and time their arrival accordingly, reports a new study.

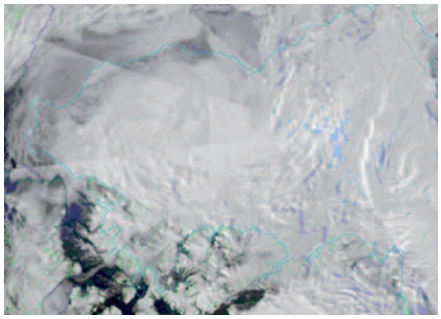
In recent decades, spring has come to Europe increasingly early — and birds that must leave Africa in late winter, weeks before they can feel the European breeze, have somehow anticipated the change, still reaching their breeding grounds just as the temperature warms. Nicola Saino and Roberto Ambrosini of the Università degli Studi di Milano in Italy found that February temperatures in the African Sahel and sub-Sahel regions, where many Europe-bound birds winter or stop over, negatively correlate with March and April temperatures in Europe. Thus, a colder African winter could cue the birds to an early-onset European spring.

The researchers support this idea with preliminary evidence that early arrival of seven breeding bird species is associated with colder Februaries in the Sahel. The ties between the African and European climates may, however, have weakened since 1980, they also found. As the world warms further, the birds might have less future success in predicting spring accurately.

Anna Barnett

CRYOSPHERE

Arctic meltdown



US NATIONAL SNOW AND ICE DATA CENTER

Geophys. Res. Lett. **35**, L01703 (2008)
Arctic sea ice is retreating at an accelerating pace, with scientists describing the decline from July to September 2007 as "precipitous". At the end of the 2007 summer melt, the area of ice cover was 38 percent less than the average since 1978. The decline had averaged 3 percent per decade from 1978 to 1996, but more than tripled to 11 percent from 1996 to 2007.

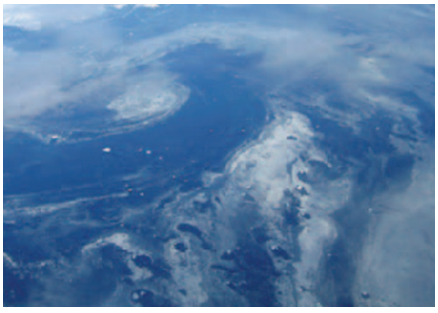
NASA scientists Josefino Comiso and Claire Parkinson analysed the latest data and found that 14 September 2007 marked the record minimum of Arctic ice since satellite observations began. The decline from 2005 to 2007 represented a summertime ice loss roughly the size of Egypt. The researchers attribute the exceptional loss in 2007 in part to higher sea surface temperatures and warm southerly winds reaching the Beaufort and Chukchi Seas, but they say that other factors play a role. In particular, open water absorbs more sunlight than ice, further warming the Arctic Ocean; this has created a feedback mechanism over the past decade, leading to further ice loss.

The Arctic could be ice-free in summer within a few decades, the researchers say, with major consequences for ecosystems. Given further predicted warming, they do not anticipate a reversal of the trend anytime soon.

Harvey Leifert

CLIMATE VARIABILITY

Nature rules regionally



SIMON PEARSON

Science doi:10.1126/science.1146436 (2008)

Uneven warming of the North Atlantic Ocean during the last half-century may be caused by changes in the natural climate system, concludes a new analysis.

Susan Lozier of Duke University in North Carolina and colleagues compared heat-content measurements in the North Atlantic region from 1950 to 1970 and from 1980 to 2000. Over the 50-year period, the North Atlantic as a whole heated up moderately, but finer-scale changes were more complex, they found. Tropical and subtropical areas gained up to ten times more heat than the North Atlantic average, but in contrast, the subpolar zone cooled almost as markedly.

Using a modelling approach, the researchers showed that the observed heating and cooling pattern may have been caused primarily by changes in a large-scale climate system known as the North Atlantic Oscillation (NAO). Since the observed variations in regional heat gain and loss are great enough to mask an underlying greenhouse warming trend, the authors warn it is too early to know whether the changes in heat content are partly due to anthropogenic climate change. They say that long-term monitoring is needed to tell whether humans have heated the North Atlantic, perhaps even by affecting the NAO itself.

Anna Barnett

CLIMATE PREDICTION

Fine-tuning feedback

EDWIN OLSON

Geophys. Res. Lett. **35,** L01702 (2008)

Some climate models predict that the agricultural heartland of the US will warm as much as 7 to 8 °C by the twenty-second century and dry out drastically, whereas others predict much more modest changes. Researchers have now found an important cause of this variability in models: a mechanism known as snow albedo feedback, which occurs as the snowpack retreats and the exposed ground absorbs more solar radiation.

Alex Hall and colleagues at the University of California, Los Angeles compared sensitivity to snow albedo feedback across 18 climate forecast models that were used in the most recent assessment report of the Intergovernmental Panel on Climate Change. Models with the strongest feedback from the melting of snow in winter and spring yielded the most warming and greatest drying in summer. By comparing feedback strength from the models to independent estimates from satellite data, the researchers found that over half of the models had unreasonable estimates of snow albedo feedback.

The researchers say that variability in climate predictions for the interior US could be reduced by one-third to one-half by including accurate observations of this key parameter in the next generation of climate models.

Alicia Newton