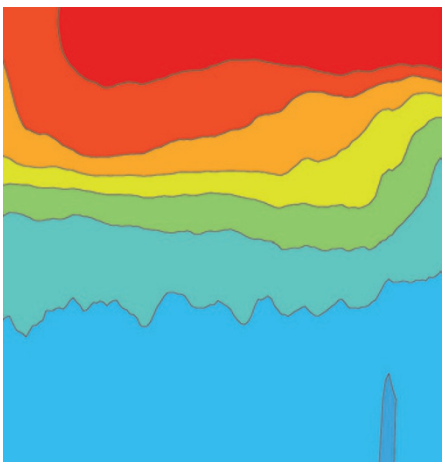
SOS for the climate system

A tipping point occurs when a relatively small external change forces an apparently disproportionate response in a system, shifting it from one stable state to another. A Review by Timothy Lenton shows that predicting tipping points, such that early warning becomes feasible, has proved elusive, but that it is possible in principle and could considerably reduce the risk that climate change poses to society. Lenton considers recent scientific progress on the early warning of climate tipping points, focusing on statistical techniques for detecting the change in a system, such as increased variance or a sluggish response to disturbance, as well as the research needed to develop warning systems. In a related Feature, Mason Inman looks at the progress that scientists are making in detecting abrupt change in ecological systems. Small-scale changes, such as the point at which a lake becomes oligotrophic, could be easier to prevent, and new studies — drawing on both computer models and field data — offer encouraging signs that detecting changes at this level is possible and may scale-up to other systems. If so, then scientists will be one step closer to identifying vulnerable systems and stopping regime shifts before they happen.

[Review Article p201; Feature p180]



A voice for the humanities

The Intergovernmental Panel on Climate Change (IPCC) is hugely influential in setting the tone for wider social and political engagement with climate change. Mike Hulme highlights the limited uptake of social science material into the IPCC assessment reports despite the proliferation of social science research on climate issues. He argues that nature and society are so deeply entangled that research must strive to examine how each is shaping the other, and then outlines the changes needed to close the gap between arts and sciences on issues of climate change and beyond.

[Commentary p177]

A push from pathogens

Climate change can affect plant growth directly, but also indirectly through its influence on predation and disease. Plant growth in turn affects carbon storage. A seven-year study by Johan Olofsson and colleagues into the effects of increased snow cover on tundra plant communities in Sweden shows that plant disease in an Arctic tundra ecosystem can alter and even reverse the effects of a changing climate on carbon balance by influencing plant composition. In experimental plots, after six years of increased snow cover the disease killed the majority of the shoots of the dominant plant species and significantly reduced instantaneous carbon exchange immediately afterwards.

[Letter p220; News & Views p192]

Energy for water

The water industry is a thirsty business — abstraction, transport and treatment of fresh water and wastewater are all energy-intensive processes. Although much attention has been given to the need for water resource management, less has been given to growing energy use and associated greenhouse-gas emissions from the water sector. A Review by Sabrina Rothausen and Declan Conway suggests that there is a need for energy use to be further quantified and integrated into water resource management. This transparency is likely to be important for the water industry to meet carbon commitments while responding to other drivers such as stricter quality standards and increasing demand for water.

[Review Article p210]

Towards competent crop models

To meet the world's growing demand for food, it may be necessary to boost agricultural productivity by as much as 70% by 2050. The extent to which large yield gains can be achieved in a changing climate remain unknown, but estimates depend heavily on crop models. Reimund Rötter and colleagues argue that current crop-modelling tools are out of date and not fit for purpose. They argue strongly that researchers need to switch to more rigorous multi-model approaches to better quantify inherent uncertainties. Only then will model estimates of crop yields under climate change provide a firm basis for delivering robust and usable information, for everyone from farmers to policymakers.

[Commentary p175]

The growing climate gap

Climate change has reached the level of a 'scientific consensus', but is far from a 'social consensus'. New research by Aaron McCright and Riley Dunlap, discussed in this issue by Andrew Hoffman, highlights a growing divide between liberals and conservatives in the American public as a major obstacle to social consensus. This political and ideological divide is explained in terms of the 'filters' that people apply, that is, they tend to endorse views that reinforce their connection with other members of their political or ideological group. Their analysis raises questions about the viability of social consensus on climate change as a goal.

[News & Views p195]