BIOGEOCHEMISTRY

Invasive productivity

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Coastal wetlands are under pressure from multiple global change factors, often including rising atmospheric CO_2 concentrations, nitrogen enrichment and plant invasions. The consequent changes in primary productivity have implications for key ecosystem processes such as soil accretion and carbon sequestration, but understanding the interacting effects of these drivers is challenging.

Joshua S. Caplan from Bryn Mawr College, USA, and co-workers combine nitrogen and CO_2 enrichment field experiments with modelling to quantify the effect of these factors and invasion by the reed *Phragmites australis* on carbon assimilation and retention in North American mid-Atlantic saltmarshes.

They find that the high susceptibility of nitrogen-enriched saltmarshes to *Phragmites* invasion is facilitated by strong carbon gains early and late in the growing season. This effect accounted for a 3-fold increase in net primary productivity compared with native vegetation.

Additionally, elevated CO_2 levels enhanced *Phragmites* productivity throughout the growing season. The authors suggest that these effects can be expected to accelerate the spread of *Phragmites* and may also increase saltmarsh below-ground carbon storage. *AB*

POLITICS

Climate capitalism

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Increasingly, companies are appearing to care about climate change. This concern is often expressed in calls for policymakers to divert resources away from polluting energy sources to low-carbon technological fixes with as little regulation as possible. This strategy often suits the same set of investors.

Analysis by Jean Philippe Sapinski, from the University of Oregon, USA, sheds light on how 'climate capitalism' spreads among the world's largest companies and filters into political debates. It maps actors who sit on the boards of both the world's largest companies and corporate-funded climate and environmental lobby groups.

The analysis finds that a handful of organizations — including the World Business Council for Sustainable Development, Global Compact, the International Emissions Trading Association and Club of Rome — are particularly well-connected within this network. It identifies a core 'climate capitalist inner circle' of 11 members who have particular influence, several of whom sit on the boards of fossil fuel and nuclear power companies.

This suggests that the aims of a weak form of climate capitalism and high-carbon companies may be well-aligned, casting some doubt on the effectiveness of such strategies to significantly tackle climate change. *MH*

CRYOSPHERE

Tracking meltwaters

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The Greenland ice sheet, the largest Northern Hemisphere store of fresh water, is at risk as temperatures increase. Surface melt and the subsequent runoff into the ocean will cause sea level to rise. However, the amount of melt that actually leaves the ice sheet is unknown, as it can filter through the porous compacted snow on the surface and refreeze — at least until that space is filled.

Charalapos Charalampidis of the Geological Survey of Denmark and Greenland, Copenhagen, and co-workers use *in situ* measurements from the Kagerlussauq region of West Greenland to investigate changes in the glacier volume (known as surface mass balance, SMB) and meltwater runoff for 2009–2013. Data from 7 automatic weather stations and 9 SMB stakes reveals that although both 2010 and 2012 were 'warm' years, 2012 experienced a greater SMB loss and melt runoff. Meltwater on the ice surface also lowered the reflectivity, resulting in the absorption of 28% more solar energy than average. The authors explain the higher runoff in 2012 as a result of limited storage available in the surface snow, because of low snowfall in the region and the space having previously been filled. *BW*

DETECTION AND ATTRIBUTION

Atmospheric circulation

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The increase in global surface temperatures due to climate change is well known. Another, less-explored consequence is thermal expansion of the atmosphere, which can trigger circulation changes that also affect regional climate.

Nikolaos Christidis and Peter A. Stott, from the Met Office Hadley Centre, UK, investigate recent changes (from 1979 onwards) in the temperature and circulation of the lower atmosphere. Using satellite and model data, they determine trends in geopotential height, a measure of the height necessary to reach a given pressure in the atmosphere (in this case, 500 millibar). They then use statistical analysis to attribute these changes to either natural or anthropogenic causes.

Overall, they find a significant increase in this geopotential height owing to human influence. However, this trend is spatially variable. For example, in the Northern Hemisphere the increase is stronger over the poles relative to the mid-latitude regions. This could affect the position of the North Atlantic jet stream, which regulates European climate.

This suggests that warming of the lower atmosphere may lead to circulation changes. But this effect is weak and needs to be investigated further to determine which changes are robust. *ET*

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