PHENOLOGY

Seasonally uneven warming

Oecologia http://doi.org/c2jk (2019)

Credit: Incamerastock / Alamy Stock Photo

Climate warming tends to extend the vegetative growing seasons through earlier spring activity or later autumn dormancy, or some combination of the two. Responses are often quite complex in practice however, due to modulating factors such as snow cover and because warming in many regions is inconsistent across the year. In Europe, for example, winter and spring months are warming twice as fast as months in the summer and autumn.

Constantin M. Zohner at ETH Zurich, Switzerland, and Susanne S. Renner at Munich University, Germany, use an experimental approach to investigate the phenological response of several deciduous European trees to 4 °C of warming in winter and spring, summer and autumn, and all year.

The all-year warming treatment led to significantly delayed leaf senescence, but advanced the end of primary growth (bud set). The summer and autumn warming treatment delayed leaf senescence; and the winter and spring warming treatment advanced bud set and leaf senescence. This suggests that continued enhancement of warming in winter and spring will lead to earlier end-of-season growth cessation, even if leaf senescence is delayed. *AB*

https://doi.org/10.1038/s41558-019-0431-y

PHYSICAL OCEANOGRAPHY

Overturning observations

Science **363**, 516–521 (2019)

Credit: Colin Varndell / Alamy Stock Photo

The Atlantic Meridional Overturning Circulation (AMOC) is projected to slow down in the twenty-first century. Observations across the Atlantic basin, at different latitudes, are needed to understand changes in the MOC, which led to the Overturning in the Subpolar North Atlantic Program (OSNAP). This observing system has two sections — the west section covers the southeast Labrador Shelf to the southwest tip of Greenland, and the east section covers the southeast tip of Greenland to the Scottish shelf — and was deployed in the boreal summer, 2014.

Susan Lozier and Feili Li of Duke University, United States, and their co-authors analyse the first 21 months of data (to April 2016) to show that the transport of heat and freshwater across the observing line is primarily a result of the overturning circulation. The authors depart from the previous view that AMOC variability is controlled by Labrador Sea deep-water formation. They suggest that the conversion of warm, salty, shallow Atlantic waters to colder, fresher, deep waters north of the OSNAP line (from Greenland to Scotland) drives the overturning and its variability in the subpolar region. *BW*

https://doi.org/10.1038/s41558-019-0433-9

ATMOSPHERIC CHEMISTRY

Coal methane unabated

Nat. Commun. **10**, 303 (2019)

China ranks highest for methane gas (CH_4) emissions, due in large part to its reliance on coal for electricity generation. In the mid 2000s, the country began developing a regulatory programme designed to mitigate and utilize coal mine methane (CMM) emissions, but it remains unclear whether emissions have declined as intended.

Scot Miller of Johns Hopkins University and colleagues analyse Greenhouse gases Observing SATellite (GOSAT) observations between September 2009 and September 2015, and find that CH_4 emissions in China increased at a rate of 1.1 Tg CH_4 y^{-1} and account for an estimated 11–24% of the global trend. The increasing emissions trend is comparable to that observed prior to 2010. Further analysis shows that emissions are highest in regions where coal mining predominates and continue to follow a business-as-usual scenario, despite targeted environmental regulations.

In light of increased coal production, even ambitious CMM drainage and utilization policies appear insufficient to stem China's CH_4 emissions. *AY*

https://doi.org/10.1038/s41558-019-0432-x

ADAPTATION

Social capital supports action

Clim. Develop. http://doi.org/c2jn (2019)

Small Island Developing States (SIDS) face problems of land degradation, marine pollution, biodiversity loss, and susceptibility to natural disasters, all of which are exacerbated by climate change. Because SIDS produce negligible greenhouse gas emissions, they can only respond by adapting to climate change impacts. However, SIDS tend to be rural, remote, and not strongly supported by national institutions. Consequently, it falls to local communities to initiate and implement adaptation strategies.

L. C. Hagedoorn from Vrije Universiteit Amsterdam and colleagues conducted household surveys in a coastal community in the Federated States of Micronesia. Social capital, which reflects the strength of relationships between people and their community, had the strongest effect on willingness to contribute time to community adaptation, followed by perception of climate change risk. Large household size and high resource dependency — which characterize SIDS communities — were associated with less adaptation intention. Communities with high social capital present good opportunities for successful adaptation, but projects need to be carefully designed to ensure that they do not undermine this social capital by changing community power structures or access to resources. *JR*

https://doi.org/10.1038/s41558-019-0434-8

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