ECOLOGY

Rain on the lemming parade

Arctic Sci. http://doi.org/cvp6 (2018)

Credit: Wildscotphotos/Alamy Stock Photo

Cycles of population boom and bust are common in Arctic species. Lemmings are perhaps the best known example, and their population cycles are ecologically important in the high Arctic. Surprisingly, the drivers of these cycles remain a matter of debate. As lemmings live for much of the year under the snow, modulating the winter climate that they experience (the subnivium), changes in snow cover could contribute to these dynamics.

Florent Domine from the Université Laval, Canada, and CNRS, France, and co-authors investigate the influence of physical snowpack characteristics on brown lemming population dynamics in the Canadian high Arctic using lemming population data and snow modelling over the period 2003–2014. They were particularly interested in the effects of the hardness of the basal layer of snow — which is determined by rain-on-snow events and wind storms in autumn.

They find that winter lemming population growth shows a strong negative response to rain-on-snow occurrence and that summer population and winter nest densities are also negatively affected, although to a lesser extent. The increasing occurrence of rain-on-snow events projected under climate warming can be expected to strongly impact lemming populations and consequently the wider high Arctic ecosystem. *AB*

https://doi.org/10.1038/s41558-018-0333-4

BIOGEOPHYSICAL FEEDBACKS

Warming from cover crops

Geophys. Res. Lett. http://doi.org/gd6d4v (2018)

Credit: Nigel Cattlin/Alamy Stock Photo

Planting winter cover crops is a common agricultural management strategy that provides local benefits, including reduced soil erosion and improved soil quality. However, the impact of cover cropping on climate change is less well established.

Danica Lombardozzi of the National Center for Atmospheric Research, USA, and colleagues conduct a modelling experiment using the land and atmosphere components of the Community Earth System Model to assess the biogeophysical climate impacts of cover cropping throughout North America. Simulated cover crops are shown to potentially increase wintertime surface air temperature up to 3 °C for the northern United States and southern Canada. Leaf area and snow depth interact to impact surface albedo and latent heat flux. Consequently, wintertime warming is greatest where the winter snowpack is shallow and crops protrude above it. Although cover cropping has clear agricultural benefits and may even increase sequestration of carbon in soils, selecting appropriate varietals with less leaf cover or shorter heights to fit local conditions may be necessary to minimize winter warming. *AY*

https://doi.org/10.1038/s41558-018-0334-3

CLIMATE CHANGE ADAPTATION

Pay now or pay more later

Environ. Commun. **12**, 911–927 (2018)

There is broad agreement that combatting climate change requires both adaptation and mitigation strategies. However, adaptation polices that assuage the impacts of climate change may undermine individuals' support for mitigation efforts, because these behaviours will be seen as less necessary to avoid negative consequences.

Brian Greenhill from the University at Albany, State University of New York, and co-authors conducted an online survey in which US respondents read a fictional newspaper article about a proposed gasoline tax, and then indicated the amount (in cents per gallon) that they would be willing to pay for this proposed tax. Respondents who read newspaper articles that provided information about the costs of adaptation were more likely to support a higher gasoline tax than respondents in the control group who read articles in which adaptation costs were not mentioned, controlling for political and demographic characteristics. Providing information about ancillary benefits associated with the proposed tax had no influence on tax support. These results suggest that providing information about adaptation costs modestly enhances support for mitigation, possibly because it presents mitigation as an option between paying now, or paying more later. *JR*

https://doi.org/10.1038/s41558-018-0336-1

ATMOSPHERIC SCIENCE

Falling snow feedbacks

J. Geophys. Res. Atmos. http://doi.org/cvp2 (2018)

Climate models do not typically simulate the radiative effects of precipitating hydrometeors — that is, falling snow. Previous studies have demonstrated that systematic model biases arise in the tropical Pacific due to this exclusion, including excessive atmospheric instability, a corresponding increase in deep convection and warmer sea surface temperatures. Chao-An Chen from Academia Sinica, Taiwan, and colleagues further investigate these biases in light of anthropogenic forcing, using simulations with the Community Earth System Model (CESM1) in which snow radiative effects are either 'on' or 'off', and CO_2 concentrations that increase by 1% per year.

With anthropogenic forcing, it is found that convective regions in the Pacific are intensified and shifted eastwards. However, when snow radiative effects are included, these changes — radiative balance, circulation and precipitation — are all amplified, leading to reduced precipitation around the maritime continent, but a near doubling over the western Pacific. Snow 'off' simulations compare well to CMIP5 output, suggesting that projected changes in the tropical Pacific may presently be underestimated. Thus, future work should aim to incorporate the impacts of falling snow into coupled climate models. *GS*

https://doi.org/10.1038/s41558-018-0335-2

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