

Cold winters caused by warmer summers, research suggests

January 12 2012

Scientists have offered up a convincing explanation for the harsh winters recently experienced in the Northern Hemisphere; increasing temperatures and melting ice in the Arctic regions creating more snowfall in the autumn months at lower latitudes.

Their findings may throw light on specific weather incidents such as the extremely harsh Florida winter of 2010 which ended up killing a host of tropical creatures, as well as the chaos-causing snow that fell on the UK in December 2010.

Published today, Friday 13 January, in IOP Publishing's journal *Environmental Research Letters*, this new research suggests that the trend of increasingly [cold winters](#) over the past two decades could be explained by warmer temperatures in the autumn having a marked effect on normal [weather patterns](#), causing temperatures to plummet in the following winter.

The strongest winter cooling trends were observed in the eastern United States, southern Canada and much of northern Eurasia, which the researchers, based at Atmospheric and Environmental Research (AER), the University of Massachusetts and the University of Alaska Fairbanks, believe cannot be entirely explained by the natural variability of the [climate system](#).

Their results showed strong warming throughout July, August and September in the Arctic, which continued through the autumn and,

according to their observational data, appeared to enhance the melting of sea ice.

This warmer atmosphere, combined with melting sea ice, allows the Arctic atmosphere to hold more moisture and increases the likelihood of precipitation over more southern areas such as Eurasia, which, in the freezing temperatures, would fall as snow. Indeed, the researchers' observations showed that the average snow coverage in Eurasia has increased over the past two decades.

They believe the increased [snow cover](#) has an intricate effect on the Arctic Oscillation – an atmospheric pressure pattern in the mid- to high-latitudes – causing it to remain in the "negative phase".

In the "negative phase", high pressure resides over the Arctic region, pushing colder air into mid-latitude regions, such as the United States and northern Canada, and giving the observed colder winters.

The lead author of the study, Judah Cohen, said: "In my mind there is no doubt that the globe is getting warmer and this will favour warmer temperatures in all seasons and in all locations; however, I do think that the increasing trend in snow cover has led to regional cooling as discussed in the paper and I see no reason why this won't continue into the near future. Also if it continues to get much warmer in the fall, precipitation that currently falls as snow will fall as rain instead, eliminating the winter cooling."

It is also deduced that one of the main reasons conventional climate models fail to pick up on this observed winter cooling is their failure to account for the variability of snow cover, which, as demonstrated in this study, can greatly improve the accuracy of seasonal, and lengthier, forecasts.

"We show in the paper how using the snow cover in a seasonal forecast can provide a more skilful or accurate forecast. Without correctly simulating the coupling of winter climate patterns and the variability of snow fall, the models currently used by Government centres miss an important influence on winter and will therefore continue to be deficient in predicting winter weather on seasonal time scales, and even longer decadal time scales," continued Cohen.

More information: *Environ. Res. Lett.* 7 014007
iopscience.iop.org/1748-9326/7/1/014007

Provided by Institute of Physics

Citation: Cold winters caused by warmer summers, research suggests (2012, January 12)
retrieved 20 March 2024 from <https://phys.org/news/2012-01-cold-winters-warmer-summers.html>

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