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Melting Arctic link to cold, snowy UK winters

By Richard Black Environment correspondent, BBC News



This winter brought snow as far south as Greece

The progressive shrinking of Arctic sea ice is bringing colder, snowier winters to the UK and other areas of Europe, North America and China, a study shows.

As global temperatures have risen, the area of Arctic Ocean covered by ice in summer and autumn has been falling.

Writing in [Proceedings of the National Academy of Sciences \(PNAS\)](#), a US/China-based team show this affects the jet stream and brings cold, snowy weather.

Whether conditions will get colder still as ice melts further is unclear.

There was a marked deterioration in ice cover between the summers of 2006 and 2007, which still holds the record for the lowest extent on record; and it has not recovered since.

The current winter is roughly tracking the graph of 2007, according to the US National Snow and Ice Data Center (NSIDC).

The new study is not the first to propose a causal relationship between low Arctic ice in autumn and Europe's winter weather.

"It's possible that future winters will be colder and snowier, but there are some uncertainties"
Jiping Liu Georgia Institute of Technology

But it has gone further than others in assessing the strength of the link.

Through observations and computer modelling, the team headed by Jiping Liu from Georgia Institute of Technology in Atlanta, US, and the Institute of Atmospheric Physics in Beijing has also elucidated the mechanisms involved.

"For the past four winters, for much of the northern US, east Asia and Europe, we had this

persistent above-normal snow cover," Dr Liu told BBC News.

"We don't see a predictive relationship with any of the other factors that have been proposed, such as El Nino; but for sea ice, we do see a predictive relationship."

How it happens

If less of the ocean is ice-covered in autumn, it releases more heat, warming the atmosphere.

This reduces the air temperature difference between the Arctic and latitudes further south, over the Atlantic Ocean.



The dwindling Arctic summer ice may have severe consequences for wildlife

In turn, this reduces the strength of the northern jet stream, which usually brings milder, wetter weather to Europe from the west.

It is these "blocking" conditions that keep the UK and the other affected regions supplied with cold air.

The researchers also found that the extra evaporation from the Arctic Ocean makes the air more humid, with some of the additional water content falling out as snow.

"I agree with the study - I have no beef with the case that declining Arctic sea ice can drive easterly winds and produce colder winters over Europe," commented Adam Scaife, head of monthly to decadal prediction at the UK Met Office.

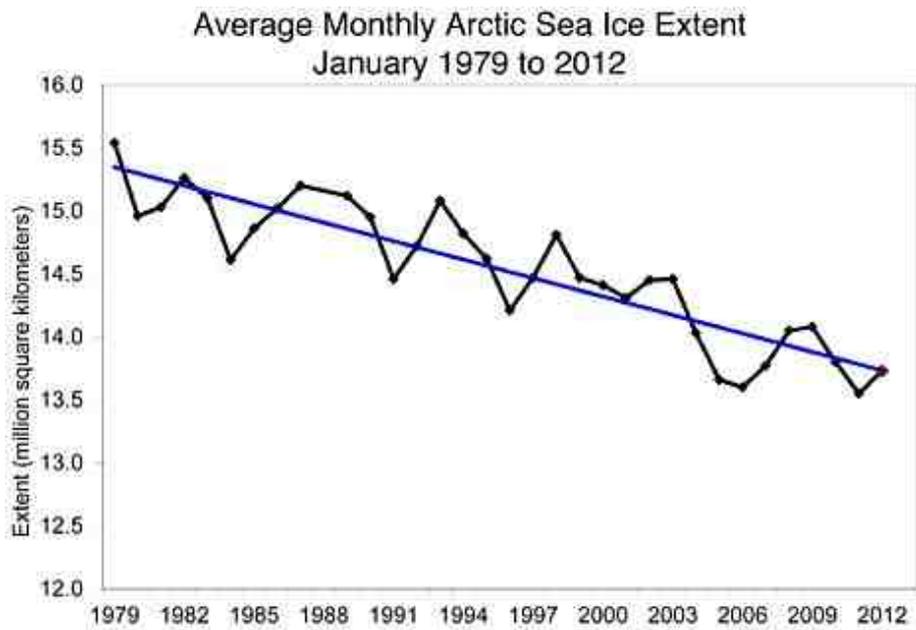
Research in other institutions, including the Met Office, confirmed the argument, he said.

Dr Scaife was involved with [another study](#) published last year that showed how small, natural changes in the Sun's output can also affect winter weather.

And he emphasised that the declining Arctic ice cover was just one of several factors that could increase blocking.

"You can hit a bell with anything, and you still produce the same note," he told BBC News.

"This is no bigger than the solar effect or the El Nino effect. But they vary, whereas Arctic ice is on a pretty consistent downward trend."



Arctic sea ice is on a downward curve, according to data from NSIDC
 The picture is further complicated by the involvement of the Arctic Oscillation, a natural variation of air pressure that also changes northern weather.



Dr Len Shaffrey, University of Reading: "This is very early days for this research"

The oscillation is not understood well enough to predict - and even if it were, any pattern it has may be changing due to escalating greenhouse gas concentrations.

Nevertheless, the research suggests that on average, winters in the UK and the rest of the

affected region will be colder in years to come than they have been in recent decades.

Various computer simulations have generated a range of dates by which the Arctic might be completely ice-free in summer and autumn, ranging from [2016](#) to about 2060.

A few years ago, one projection even showed 2013 was possible, though this now appears unlikely.

So a related question is whether UK winters will get colder and snowier still as the melting progresses,

"It's possible that future winters will be colder and snowier, but there are some uncertainties," cautioned Dr Liu.

His team's next research project is to feed Arctic ice projections and the mechanisms they have deciphered into various computer models of climate, and see whether they do forecast a growing winter chill.

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