Warming Arctic blamed for worsening summer heatwaves

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The team that uncovered this Arctic effect says it caused the Russian heatwave of 2010, which lasted six weeks, killing crops and causing massive forest fires; the west European scorcher of 2003 that killed an estimated 70,000 people; and possibly the record US heatwave of 2012, which decimated corn crops.

Dim Coumou and colleagues at the Potsdam Institute for Climate Impact Research in Germany studied atmospheric circulation in the northern hemisphere from 1979 to 2013. They found longer and more frequent hot spells in mid-latitudes that, they say, are likely to have been triggered by a reduction in the temperature difference between the Arctic, which is warming quickly, and mid-latitudes, where average warming is slower.

The Arctic has in fact warmed twice as fast as the rest of the globe, because of the melting of the ice replaces a reflective surface with dark ocean that absorbs much more solar energy.

Climatologists believe that this temperature difference drives the general west-to-east movement of mid-latitude weather systems, such as the depressions that bring storms and the high-pressure systems that bring hot dry weather in summer and intense cold in winter. A smaller temperature difference slows these systems down, so their associated weather persists for longer.

Bogged down for weeks

Coumou's team found that the frequency of stalled weather systems in summer has doubled since the onset of rapid Arctic warming around 2000. In many cases, they stop moving for weeks at a time. That can mean long spells of hot weather that dry out soils, kill crops, empty rivers, trigger forest fires – and strain the body, with consequences for our health. So even though average weather is not changing much at mid-latitudes, the incidence of heatwaves is increasing fast.

Until recently, says Coumou, researchers had presumed that impact of the Arctic warming on mid-latitudes was greatest in autumn and winter, when heat flows from the oceans into the cooled atmosphere.

The resulting stalled weather systems have been blamed - alongside the changing polar vortex - for the present long cold winter in the eastern US and the one immediately before this. But Coumou says that the summer effects are just as strong.

Jennifer Francis of Rutgers University, New Jersey, says the findings support her hypothesis that Arctic warming is slowing the jet stream, a high-altitude wind that drives atmospheric circulation at ground level in mid-latitudes.

"Coumou and his colleagues are looking at the individual weather systems that ride along the flow of the jet. And they find that as the Arctic warms, the weather systems stall, leading to more persistent heatwaves," she says. "In the case of heatwaves, there is less surface wind to stir up and distribute heat from a scorching sun beating down on dry soil."

With the Arctic melt set to continue, the long-range forecast is looks set to feature more heatwaves and more drought.