Warming world means a hike in US lightning strikes

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And the hits keep coming *(Image: Zuma/Rex)*

Golfers beware. Expect more lightning bolts as the world warms up.

We already know that climate change is increasing the likelihood of storms, tornadoes and heatwaves. Now, a model of how climate change will affect lightning patterns in the US predicts that for every 1Â°C of global warming, lightning strikes will increase by 12 per cent.

Currently, there are about 25 million lightning strikes each year in the US. These ignite half of the wildfires that break out and kill approximately 100 people every year. More lightning potentially means more wildfires, and more strikes on people and buildings.

Researchers led by David Romps at the University of California, Berkeley, applied their lightning-analysis method to 11 standard projections of climate change, which range in predicted global warming from 2.5Â°C to 5Â°C.

Overall, they forecast that lightning bolts will increase in number by 50 per cent over the next century. "For every two lightning strikes in 2000, there will be three in 2100," says Romps.

At present, meteorologists work out how likely lightning strikes will be from the depth of clouds â€“ the deeper the clouds, the more likely they will generate lightning.

## Hot and humid

Romps's team relied instead on standard forecasts of rainfall per unit of area, and how energetic a storm will potentially be, which can be worked out from temperature and humidity measurements taken by weather balloons.

By knowing how much water is in the clouds and how much energy is available, Romps says his model can accurately predict how many lightning bolts will get generated. Typically, he says, about 1 per cent of the potential energy picked up by water gets converted to lightning, so by knowing how much water and energy is present, the team can work out how much lightning will form.

They tested the model using real weather data from 2011, and compared the results with the data on every lightning strike in the US, collected by the National Lightning Detection Network. In simple terms, they found that it retrospectively correctly accounted for 77 per cent of that year's ground strikes (see video, above, for 2011's lightning strikes). "When I saw that result, I thought it was too good to be true," says Romps.

Having validated it against past weather, Romps applied it to the 11 climate models. The resulting prediction estimated that for every 1Â°C rise in global temperatures, there would be a rise in lightning strikes of 12 per cent, on average. Across the 11 models the projections for increases in lightning ranged from 3.4 per cent per 1Â°C to 17.6 per 1Â°C in the worst-case scenario. In this worst-case scenario, with 5Â°C of global warming, lightning strikes more than doubled by the year 2100.

The new model "probably yields a better estimate than previous methods", says William Beasley at the University of Oklahoma in Norman. He adds that the precision might be improved further if the model could include data on ice particles in clouds â€“ in addition to liquid water â€“ plus information on bolts that occur only in clouds, as these are five to 10 times more frequent than ground strikes.

Romps's team aims to work out how the additional lightning will be distributed â€“ whether it will increase where storms are already most common, or spread to areas relatively free of lightning at present. "At this point, we don't know, but the distribution of lightning strikes is important for predicting changes to wildfire frequency," Romps notes.

He is optimistic that the same model could be applied to other regions of the world.

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