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Record hot year may be the new normal by 2025

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Bushfires are expected to be more common in Australia in future years. Image: Peter Shanks, Flickr.

The hottest year on record globally in 2015 could be an average year by 2025 and beyond if carbon emissions continue to rise at the same rate, new research has found.

Lead author Dr Sophie Lewis from the ANU Fenner School of Environment and Society said human activities had already locked in this new normal for future temperatures, but immediate climate action could prevent record extreme seasons year after year.

"If we continue with business-as-usual emissions, extreme seasons will inevitably be the norm within decades and Australia is the canary in the coal mine that will experience this change first," said Dr Lewis, who is also from the ARC Centre of Excellence for Climate System Science.

"If we don't reduce our rate of emissions the record hot summer of 2013 in Australia - when we saw temperatures approaching 50 degrees Celsius in some areas - could be just another average summer season by 2035.

"This research tells us we can potentially prevent record-breaking seasonal temperatures from becoming average at a regional level."

The idea of a new normal has been used repeatedly when talking about climate change but had never been clearly defined until Dr Lewis and colleagues developed a scientific definition for the term.

"Based on a specific starting point, we determined a new normal occurred when at least half of the years following an extreme year were cooler and half warmer. Only then can a new normal state be declared," Dr Lewis said.

This process was also used to determine new normal conditions for seasonal and regional changes to the climate, she said.

Using the National Computational Infrastructure supercomputer at ANU to run climate models, the researchers explored when new normal states would appear under the Intergovernmental Panel for Climate Change's four emissions pathways.

The research team examined seasonal temperatures from December to February across Australia, Europe, Asia and North America.

"The results revealed that while global average temperatures would inevitably enter a new normal under all emissions scenarios, this wasn't the case at seasonal and regional levels," Dr Lewis.

"We found that with prompt action to reduce greenhouse gases a new normal might never occur in the 21st century at regional levels during the Southern Hemisphere summer and Northern Hemisphere winter."

The research, supported by the ARC Centre of Excellence for Climate System Science, is published in the *Bulletin of the American Meteorological Society*.

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