Carbon neutrality likely to increase extreme weather events by 2050, finds study

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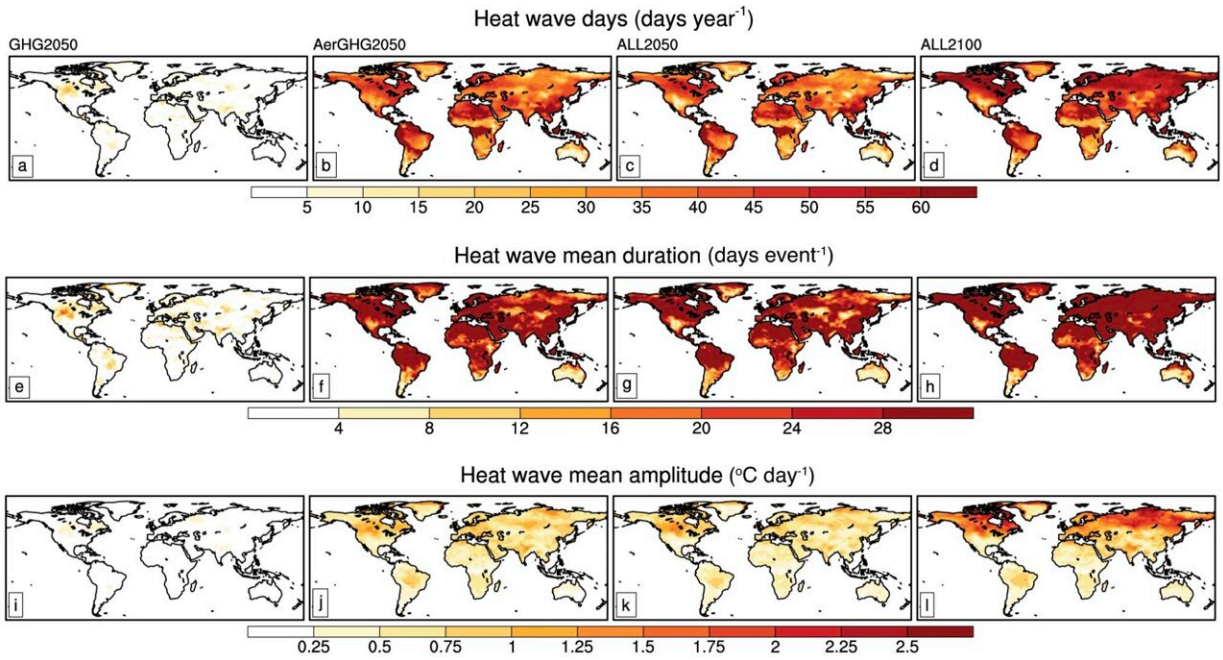

Heat wave maps charting their duration and magnitude according to different forcing simulations: greenhouse gases decrease only (GHG2050); aerosols and greenhouse gases both decrease (AerGHG2050); tropospheric ozone, aerosols and greenhouse gases all decrease up to 2050 (ALL2050) and 2100 (ALL2100). Credit: Wang et al. 2023.

Climate modeling based upon Earth's current greenhouse gas emissions trajectory predicts a worst-case scenario of 4.3°C warming of the planet by 2100 if sufficient measures are not implemented. While the Paris

Climate Agreement has been adopted by 195 countries and states, aiming to limit the global temperature increase to 2°C (preferably 1.5°C) above pre-industrial levels by 2100, the Intergovernmental Panel on Climate Change reported a 1.1°C increase up to 2020.

The comprehensive study also maintained that greenhouse gas emissions must peak by 2025 and decline by 43% thereafter for the rest of the century in order to reach this 1.5°C target.

Though implementing strategies to counteract greenhouse gas emissions and reach carbon neutrality by 2025 is a primary focus, new research published in *Nature Communications* has outlined the ever-pressing issue of atmospheric aerosols and their counterproductive effect on climate warming.

Not only this, but work by Associate Professor Pinya Wang, of Nanjing University of Information Science & Technology, China, and colleagues has highlighted the elevated frequency and intensity of extreme weather events (from flooding to heat waves) in the future and the impact this may have on communities globally, based upon a global surface air temperature and annual mean precipitation increase of 0.92°C and 0.10mm per day by 2100.

Using the Community Earth System Model, the research team determined that a decline in atmospheric aerosols negatively impacts global climate, exacerbating extreme weather occurrence more than changes in greenhouse gases or the tropospheric ozone layer (up to 10km above ground level).

Despite this, the three are intricately linked, with Wang and colleagues noting that reducing greenhouse gas emissions, especially from processing and burning fossil fuels, consequently reduces the formation of other pollutants, such as tropospheric ozone and aerosols.

This ozone forms via chemical reactions of emissions from vehicles and smokestacks, often presenting itself in the form of smog prevalent in cities, with Dammam in Saudi Arabia most recently topping the list for problematic atmospheric particulate pollution.

China is often cited as a country prone to smog, and recent work has found that vehicle and smokestack emissions of sulfur dioxide, nitrogen oxides, primary particulates