

Emissions irrelevant to future climate change?

Climate change and the carbon emissions seem inextricably linked. However, new research published in BioMed Central's open access journal *Carbon Balance and Management* suggests that this may not always hold true, although it may be some time before we reach this saturation point.

The land and the oceans contain significantly more carbon than the atmosphere, and exchange carbon dioxide with the atmosphere. The amount of CO₂ emissions absorbed by the land or the oceans vary in response to changes in climate (including natural variations such as El Nino or volcanic eruptions). So current theories suggest that climate change will have a feedback effect on the rate that atmospheric CO₂ increases; rising CO₂ levels in turn add to global warming.

The link between the carbon cycle, and human effects caused by emissions, energy use and agriculture, may only be relevant for the next 'several centuries,' suggest Igor Mokhov and Alexey Eliseev from the A.M. Obukhov Institute of Atmospheric Physics RAS, in Moscow, Russia. The authors used a climate model known as IAP RAS CM to study how feedback between our climate and the carbon cycle changes over time. In their simulations, the authors assumed that fossil fuel emissions would grow exponentially with a characteristic timescale from 50 to 250years.

In their models, Mokhov and Eliseev found that although climate–carbon cycle feedback grows initially, it then peaks and eventually decreases to a point where the feedback ceases. If we succeed in slowing down the rate of emissions, the peak would be reached much later. However, a steep increase in emissions would bring the peak in coupling between climate and carbon emissions even closer.

The authors suggest that we are heading inexorably towards the saturation peak, irrespective of how quickly we get there: “Even weak but continuing emissions lead to eventual saturation of the climate–carbon cycle feedback,” Mokhov and Eliseev explain.

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