

# Stronger evidence for human origin of global warming

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A recent statistical analysis strengthens evidence that human activities are causing world temperatures to rise. Most climate change scientists model Earth systems from the ground up, attempting to account for all climate driving forces. Unfortunately, small changes in the models can lead to a broad range of outcomes, inviting debate over the actual causes of climate change.

Physicist Pablo F. Verdes of the Heidelberg Academy of Sciences in Germany has found a way to avoid the subjective flaws of climate models by applying sophisticated analysis techniques to data from the past hundred and fifty years.

The approach mathematically stitches together known facts about the global climate into a more objective and coherent picture.

Verdes, now at Novartis Pharma, examined data on temperature anomalies, the strength of the radiation emitted from the Sun, and volcanic activity. The relatively recent increases in solar radiation, combined with reduced volcanic activity, contribute to the increase in world temperatures. However, Verdes' analysis demonstrates that these natural causes do not completely explain the observed warming.

Verdes calculated the amount of non-natural influence required to match the increases in temperature observed in the last 150 years. He plotted the influence over time. Then, he compared it to the evolution of greenhouse gasses, taking into account the cooling due to aerosols. With

allowances for error, he found that influences attributable to greenhouse gasses mirror the graph of non-natural influence needed to explain the observed temperature increase of recent decades.

His research shows that, if you look at global warming as a puzzle, and you put together the natural factors such as increased solar radiation and reduced volcanic activity, a hole remains. The human factors of greenhouse gas and aerosol emission complete the picture.

Citation: Pablo F. Verdes, *Physical Review Letters* (forthcoming article)

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