

Answers: In memory of Niels Bohr **FREE**

Naomi Pasachoff



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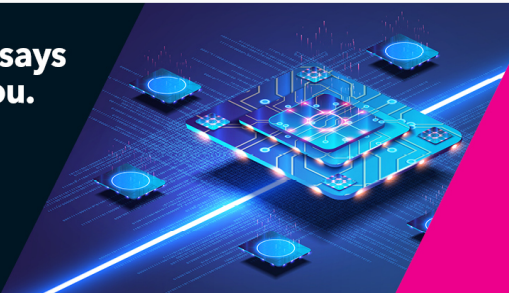


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PHYSICS TODAY

Reading to the end of the last glacial epoch

The Search and Discovery piece “Carbon dioxide drove the ending of the last glacial epoch” (PHYSICS TODAY, June 2012, page 16) could easily mislead readers who do not read through to the final paragraph. In reference to the temporal trends in temperature and atmospheric CO₂ during the last glacial retreat, early on the writer asks, “Was the increasing CO₂ an important driving mechanism of the glacial retreats, or was it mostly just a consequence of those retreats? . . . The Antarctic data, in isolation, seem to show CO₂ increase generally lagging temperature rise by a few centuries, thus suggesting that CO₂ may have been more a passenger than a driver.”

Deniers of the consensus view on global warming have used the above argument to try to discredit the idea that anthropogenic CO₂ increase is causing temperature rise. But that argument is fallacious. It is widely recognized today

that temperature and CO₂ are locked in a positive feedback relation to each other, and the Vostok ice-core data provide a means of quantifying the strength of that feedback over paleoclimatic time scales.¹ In such a feedback system, the magnitude of the effective time constants governing how temperature influences CO₂ and how CO₂ influences temperature determine the degree of asynchrony of temperature and CO₂.

As correctly stated at the end of the article, the ultimate driver of glacial-interglacial transitions has been the weak influence of varying insolation. Lag or lead, CO₂ enhances that influence and is responsible for much of the paleoclimatic variation during the past million years. Moreover, the positive feedback evident in the Vostok data suggests that carbon-climate feedback could greatly enhance future warming as well.

Reference

1. M. Torn, J. Harte, *Geophys. Res. Lett.* **33**, L10703, (2006).

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from PHYSICS TODAY, September 2012, page 9

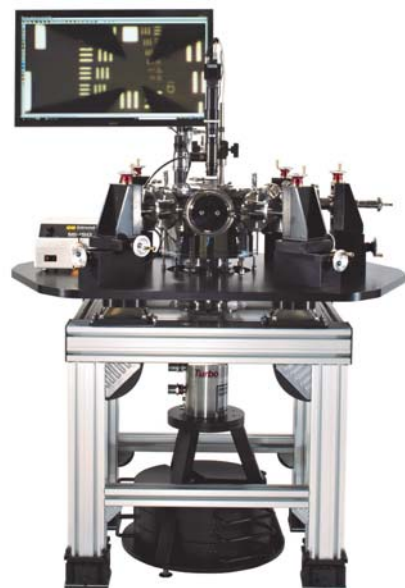
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