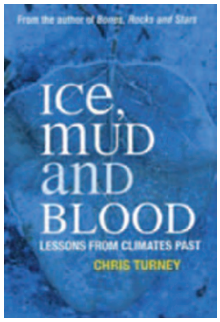
# Climate lessons




## ICE, MUD AND BLOOD: LESSONS FROM CLIMATES PAST

**by Chris Turney**

**Palgrave Macmillan: 2008. 256pp. $24.95/£15.99**

## Is past climate change a harbinger of the future?

The last two decades have seen remarkable discoveries in the field of paleoclimatology, the study of climate change in the past. We now know that the slow cycle of ice ages is punctuated by abrupt climate changes. We have documented rapid variations in the concentrations of greenhouse gases, the tremendous collapse of ice sheets, episodes of very fast sea level rise and large variations in tropical rainfall. There is good evidence that many of these changes had profound effects on ecosystems and on human civilizations. It has been an exciting time to be a scientist working in this area, and Chris Turney's book *Ice, Mud and Blood* conveys that excitement wonderfully.

Turney draws on his background as both a geologist and an environmental archaeologist, and on his familiarity with use of ice and sediment ("mud") cores to tell the story of these events. "Blood" in the title presumably refers to the hard work involved in getting paleoclimate data, or perhaps the midge bites one must put up with while extracting sediment from some boggy place in southwest England. Hard work it certainly is, but it is also clear that Turney finds it "good fun". That is perhaps the chief, and most compelling, message of the book.

The book's subtitle, *Lessons from Climates Past*, underscores a second and more serious message: the discoveries of paleoclimatologists have important lessons for the future. What are those lessons? Surely the most important one is that positive feedbacks greatly amplify climate forcing — in other words, once warming begins owing to greenhouse gas increases, other features of the Earth system kick in and further accentuate that initial warming. Turney devotes the first half of *Ice, Mud and Blood* to examples from Earth's climate history that illustrate this point.

On the one hand, we have the very warm period about 55 million years ago, referred to as the Paleocene-Eocene thermal maximum (PETM). Even though it was characterized by carbon dioxide levels at least ten times higher than those at present, the very high temperatures of the PETM, especially at high latitudes, cannot be explained without accounting for strong feedbacks such as the release of other greenhouse gases. On the other hand, we have 'snowball Earth', a period hundreds of millions of years ago when the entire planet was probably covered in ice. The expanding ice cover would have reflected more sunlight than the dark surface of the ocean. As a result of this feedback, temperatures would have dropped more rapidly than from the direct effect of lower greenhouse gas concentrations alone.

Using such examples, Turney makes a convincing case that feedbacks in the climate system are at least as strong as indicated by the most recent assessment of the Intergovernmental Panel on Climate Change, the UN authority dedicated to weighing up understanding of climate science. This is a lesson that bears repeating, and Turney does a nice job of summing up the evidence.

The other lesson Turney wishes to teach us is that "The world can change at a moment's notice," largely referring to the discovery from Greenland ice cores in the early 1990s that large climate shifts have occurred rapidly in the past — in some cases over decades or years. Here, Turney is less successful in conveying a meaningful message, deducing "It happened in the past so could happen again." The problem with this is that we still don't understand abrupt climate changes well enough to be confident in making such a statement, a point that Turney himself seems to acknowledge when he writes, "The *only thing* we do know is that when large amounts of freshwater are dumped into the North Atlantic, there can be dramatic cooling" [emphasis mine]. In his desire to draw some lesson from this fascinating area of research, he concludes that "When we'll reach the tipping point is anyone's guess but we must be getting close." This is a gut feeling, not a lesson — and it is not an idea that the average layperson, much less a negotiator for post-Kyoto climate treaties, is likely to be able to make use of.

Turney is by no means the first to try to articulate the point that paleoclimatology has lessons for our future. Richard Alley's *The Two-Mile Time Machine* and Mark Bowen's *Thin Ice*, to name just two, have made the same basic arguments. But Turney's book is the most up to date, and I would certainly recommend it to colleagues, who will enjoy it and may well learn something new, as I did. I would also recommend it to the layperson, though perhaps with a bit more caution. As Turney himself says, "It's easy to throw your arms about and argue that it got warmer or colder in the past." I fear that average readers could take Turney's book as doing just that, leaving them with the very misleading lesson that we don't really understand the climate system. One hopes that either set of readers takes to heart the last chapter, which notes that "We're not looking at some abstract timescale. These changes will affect most of us during our lifetimes."

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**Eric J. Steig**

*Eric J. Steig is a geochemist and paleoclimatologist at the University of Washington in Seattle. He is a founding contributor to the RealClimate blog.*
*e-mail: steig@washington.edu*