PLOWS, PLAGUES, PETROLEUM

William F. Ruddiman, author of *Plows, Plagues and Petroleum*: How Humans Took Control of Climate (202pp, Princeton University Press, 2005) is a paleoclimatologist who studies climate patterns as they emerged millions of years ago. Knowing the shape of the deep past, from glacial, sea bottom and other cores, allows him and other scientists to compare those ancient trends with what's happened recently, especially in the last 12,000 years, as humans have taken greater and greater control of climate.

For the last five million years the earth has been cooling; 40 to 50 glaciations have occurred in the last 2.5 million years. What we're experiencing now is a short break – geologically speaking – from a mostly glaciated world.

In predictable cycles over vast stretches of time, the Earth shifts its distance and relation to the sun, receiving more or less solar radiation according to its axial tilt and its position on an orbit which varies from elliptical to nearly round. The greenhouse gases which trap solar radiation – mainly carbon dioxide and methane – shrink and increase in cycles closely mimicking the radiation cycles, and the earth cools and warms in response. Imagine a series of peaks and valleys over millions of years, with maximum radiation, greenhouse gases and heat at the peaks, and minimum values of these at the valleys.

But the current cycle broke the ancient pattern. CO2 and methane levels, instead of continuing to sink toward the next glaciation, midway began unexpectedly to rise, toward historic highs and beyond. What changed? Humans, releasing CO2 stored in forests through slash and burn

agriculture, and methane from flooded rice fields, prevented the next ice age.

How could so few have had such an impact? Every person may have cleared as much as several dozen acres of forest in a lifetime; spread that over thousands of years, and you have your answer. Farming is “the largest alteration of Earth’s surface from its natural state that humans have yet achieved.”

To account for setbacks in the warming of the last few hundred years, Ruddiman considers what might have slowed humans’ effect on climate change – war, famine, and plagues. And only plagues can account for significant drops in greenhouse gases, occurring repeatedly from early Roman times on and culminating in the greatest pandemic of all, the death of 90% of Native Americans from European diseases from 1500 - 1700. Forests recovered fully in as few as 200 years, again storing CO2.

To account for the “hockey stick” pattern of warming – slow (the handle) then swift (the blade) beginning with the industrial revolution, Ruddiman blames fossil fuels.

How bad will it get? Oceans will rise one half meter, sea ice and glaciers will disappear. Ice caps at the poles will remain largely unchanged. Those living farthest from the temperate regions, north and south, will suffer most. For the rest of us, Novembers will become Octobers, Aprils, Mays.

What can we do? Not very much, Ruddiman admits: try to control CO2 levels, especially when coal’s all we have left to burn. We’ve let Pandora out of the box.

In any case, Ruddiman asks, will people pay to keep the earth cooler?

And what about the future? In 1,000 years the fossil fuels – oil, natural gas, and coal – will be gone, and natural cycles will resume, glaciations and warming periods alternating.

Global warming is not our worst problem, though. Overpopulation, scarcity of affordable alternative energy, depletion of aquifers, loss and degradation of soils – all are more serious.

Ruddiman seems to this reader to bring tested theories, rather than biases, to this acrimonious debate. I think he tells it like it is.