

The Earth's Great Temperature Cycles

What is known and what needs to be known about them
and their relation to the carbon cycles and to human events

With Clarence Lehman,* Jeannine Cavender-Bares, Eville Gorham,
Richard McGehee, Robert Sterner, and Shinya Sugita.



Above: The vast Hudson Bay Lowlands. Lake sediments, peat-forming wetlands, and other biotic carbon sinks around the globe are participants in our future climate. Some have been withdrawing carbon from the air and sequestering it for millennia, and continue to do so today. But they are presently overwhelmed by anthropogenic carbon emissions.

A remarkable feature of the earth's recent past is a great temperature cycle—attended by mass melting and refreezing of ice sheets, by rise and fall of the sea, by concentration and dilution of greenhouse gases. The last mass melting halted more-or-less abruptly 6000 years ago but may now be resuming, still on a modest scale, from modern injections of carbon into the atmosphere.

As relevant as this whole topic is to human events, it still seems filled with mysteries. In a broadly interdisciplinary seminar, we will take a scholarly look at what is known and not known about the biological and physical causes of the earth's temperature cycles, with particular attention to what might affect our current trajectory, and with an eye to how these phenomena are best modelled. The story is the fate of carbon in its many forms, entwined on three disparate scales of time—ecological hundred-year time, paleoecological hundred-millennium time, and geological hundred-megayear time—all now linked with us and with our planet's future.

The seminar will begin with two or more background lectures to help everyone start from the same place. Then we will launch into the literature, selected from our list or from papers you bring to the group's attention. We will meet one day a week for an hour, the time to be arranged based on mutual availability.

This need not be a narrowly focused seminar. In addition to biological and physical aspects, we can explore social, governmental, ethical, economic, and other relevant parts of this phenomenon, pursuing directions based on interests of the group or individual members.

Organizational meeting (tentative):

Thursday, September 7, 2006

12:45 p.m., Room 505, Ecology Building

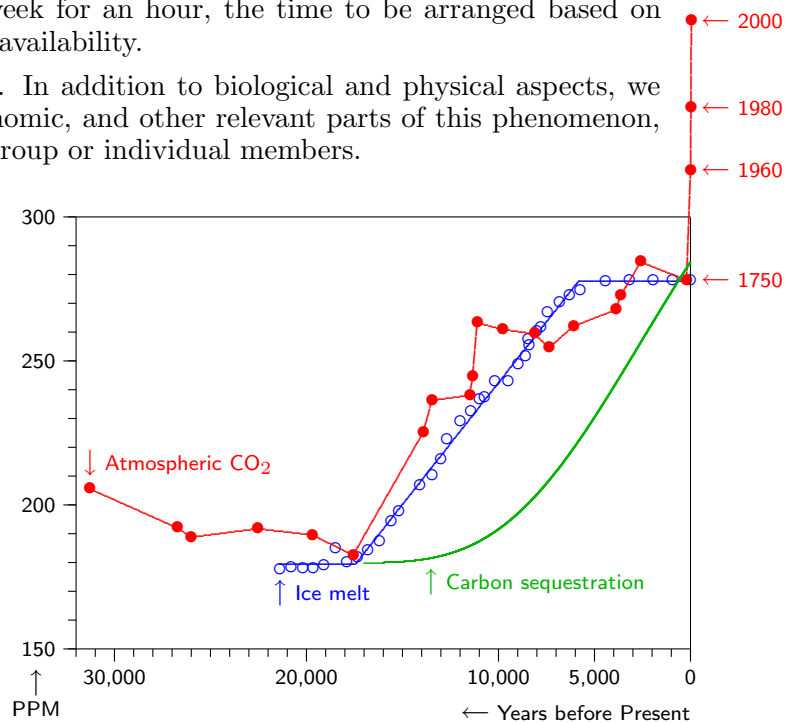
Register for:

EEB 8990, Sect. 4, Course 20565, 1 cr.

EEB 8994 available for additional credits

Contact Lisa Wiggins, wiggins@umn.edu

At the right: Dynamics of the last one-third of the earth's most recent temperature cycle, with three curves published independently but overlaid here on the same time scale to provoke thought. Red, carbon dioxide in the atmosphere, showing natural effects at the left, as indicated by Antarctic ice cores (Petit et al., 1999), and our own modern contribution at the far right (Keeling and Whorf, 2005). Blue, coincident melting of the North American ice sheets (Gorham et al., 2006, in press). Green, delayed carbon sequestration in North American peatlands (Gorham et al., 2006, in prep).



* For further information call or write lehman@umn.edu, 612-625-5734, or any of the other participants.