



# THE WOODS HOLE RESEARCH CENTER

149 Woods Hole Road · Falmouth, MA 02540-1644 USA  
Telephone 508.540.9900 · Fax: 508.540-9700 · [www.wbrc.org](http://www.wbrc.org)

## **Woods Hole Research Center Scientist Furthering Discussion of Temperature, Carbon Decomposition and Feedbacks to Climate Change**

**March 10, 2006**

Significantly more carbon is stored in the world's soils than is present in the atmosphere. In a process called a "positive feedback," global warming may stimulate decomposition of soil organic matter, thus releasing heat-trapping carbon dioxide gas to the atmosphere, possibly causing the rate of global warming to increase further. Disagreement exists, however, regarding the effects of climate change on global soil carbon stocks. Eric Davidson, a senior scientist at the Woods Hole Research Center, has written a review paper that clarifies the issues regarding temperature sensitivity of decomposition within a framework that helps to focus the ensuing debate and research. Co-authored with Ivan Janssens of the University of Antwerpen (Belgium), the study is being published in an upcoming issue of *Nature*.

According to Dr. Davidson, interest in this topic is high because of its importance in the global carbon cycle and potential feedbacks to climate change. "The arctic, in particular, is experiencing very rapid warming, causing permafrost to melt and some peatlands to dry out, thus potentially exposing huge stocks of previously frozen and waterlogged carbon to decomposition. We need to understand how much of this carbon that is stored in soils, peatlands, and permafrost is susceptible to loss in a warmer world. If you unplug your refrigerator, you can demonstrate that your food, which is basically organic matter, spoils more quickly when it is warm. However, because the soil is a complex mixture of minerals and organic matter derived from plant leaves and roots, soil scientists and ecologists have had difficulty teasing out the conditions and types of organic matter that respond significantly to temperature changes." The review paper by Davidson and Janssens sets forth a description of how both the chemical complexity of carbon molecules and the soil conditions in which they are found determine the rates at which they decompose.

While most of the research results that Davidson and Janssens review come from studies of forests and farms in temperate regions, they conclude that research on the temperature sensitivity of decomposition should be broadened to include peatlands, wetlands and permafrost in boreal and arctic regions, where huge stocks of soil carbon are susceptible to a rapidly changing climate

Davidson says, "We know that decomposition of organic matter responds to temperature, but we need to establish a common conceptual framework to demonstrate the 'what, where, and how fast' of soil carbon decomposition. Hopefully, our paper will help clarify those issues and will stimulate more research where it is most urgently needed – the potential 'time bomb' of decomposition of carbon in peatland and permafrost."

Davidson's research on soil carbon has been funded by the Department of Energy, the National Science Foundation, and NASA.

Dr. Davidson is an ecologist and soil scientist interested in the role of soil microorganisms as processors of carbon and nitrogen. He has studied the transfer of carbon and nitrogen gases from the soil to the atmosphere, where they contribute to warming of the earth. His research addresses how human management of the land affects this transfer of greenhouse gases. Dr. Davidson has held positions as National Research Council Associate at the NASA Ames Research Center and as Post-Doctoral Research Associate in Soil Microbiology at the University of California, Berkeley. He earned his doctorate in forestry at North Carolina State University.