Tennessee State University
Department of Biological Sciences

2007 SPRING SEMINAR/
CHALK TALK FORUM SERIES

Frontiers in Ecology and Evolutionary Biology

February 8	Richard J Norby Distinguished R&D Staff Member Environmental Sciences Division Oak Ridge National Laboratory http://www.ornl.gov/~rjn http://face.ornl.gov	Will CO2 fertilization of forests counteract global warming?

Seminar **Holland Hall Room 102** **11:30 – 12:30PM**

Human activities – especially the burning of fossil fuels – are causing an unprecedented increase in the amount of carbon dioxide (CO_2) in the atmosphere. CO_2 and other "greenhouse" gases interact with the balance of incoming sunlight and outgoing radiant energy from the earth's surface, which warms the atmosphere and makes our planet habitable. As the concentration of CO_2 rises, however, this greenhouse effect is intensified, and as a result our climate is getting warmer. The recent 4th Assessment Report of the Intergovernmental Panel of Climate Change left little doubt: climatic warming is occurring and it is a result of human activity. Climate change will affect all of us and our future generations; it is most important that we thoroughly understand the causes and consequences so that policy makers can make informed decisions. Climate change science involves a large array of disciplines: biologists, ecologists, atmospheric physicists, climatologists, computer scientists, sociologists, etc. As a forest ecologist, my role has been to understand how trees will respond to the increasing concentration of CO_2 in the atmosphere. CO_2 is the essential substrate for photosynthesis, which is the basis for production of plant growth and organic matter production. It is well known that photosynthesis and plant growth increase as CO_2 concentration rises, and if this occurs throughout the forests of the world and trees absorb atmospheric CO_2 at an increasing rate ("CO_2 fertilization"), then the rising concentration of CO_2 in the atmosphere will slow and climate warming will not occur quite so fast. Hence, projections of climate change depend on a good understanding of the interaction between forests and atmospheric CO_2. At the Oak Ridge National Laboratory, we have been growing a stand of sweetgum trees in an atmosphere with a CO_2 concentration that is likely to occur within the next 50 years. We have seen that these trees produce more organic matter compared to trees in today's atmosphere, but most of this extra organic matter occurs in fine roots rather than in wood. Fine roots live for only a short time (about 1 year), so we need to understand what happens to their carbon as the roots die and decompose. By combining our results with those of other similar experiments, we are getting a better understanding of forest responses that can be used to inform models of global carbon cycling and its connection to the climate. This will help the science community answer the question, "Will CO_2 fertilization of forests counteract global warming?"

Chalk Talk **Holland Hall Room 124** **2:00 – 5:00PM**