

# Final FACE harvest reveals increased soil carbon storage under elevated carbon dioxide

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From the left, ORNL's Joanne Childs, Colleen Iversen and Rich Norby dig soil pits and excavate roots and soil at the FACE site. Credit: ORNL

Elevated carbon dioxide concentrations can increase carbon storage in the soil, according to results from a 12-year carbon dioxide-enrichment experiment at Oak Ridge National Laboratory.

The increased storage of carbon in soil could help to slow down rising [atmospheric carbon dioxide](#) concentrations.

The Department of Energy-sponsored free-air carbon dioxide-enrichment, or FACE, experiment officially ended in 2009. The conclusion and final harvest of the ORNL FACE experiment provided researchers with the unique opportunity to cut down entire trees and to

dig in the soil to quantify the effects of elevated carbon dioxide concentrations on plant and soil carbon.

In a paper published in [Global Change Biology](#), Colleen Iversen, ORNL ecosystem ecologist, and her colleagues quantified the effects of elevated carbon dioxide concentrations on soil carbon by excavating soil from large pits that were nearly three feet deep. Researchers saw an increase in soil carbon storage under elevated carbon dioxide concentrations, a finding that was different from the other FACE experiments in forests.

Researchers found the increase in carbon storage even in deeper soil.

"Under elevated carbon dioxide, the trees were making more, deeper roots, which contributed to the accumulation of soil carbon," Iversen said.

Iversen pointed out that processes such as microbial decomposition and root dynamics change with [soil depth](#), and information on processes occurring in deeper soil will help to inform large-scale models that are projecting future [climatic conditions](#).

**More information:** Co-authors on the paper, "Soil carbon and nitrogen cycling and storage throughout the soil profile in a sweetgum plantation after 11 years of carbon dioxide-enrichment" are ORNL's Charles Garten and Richard Norby, FACE project leader; and Chapman University's Jason Keller.

Provided by Oak Ridge National Laboratory

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