Scientists re-examine plants' role in global warming

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Estimates of increased plant respiration in response to higher global temperatures may be somewhat overstated as they have not taken into account plants' ability to adjust to changing conditions, according to researchers from Oak Ridge National Laboratory.

In a Perspectives paper published April 28 by *Science*, a team led by Tony King cites ORNL findings suggesting that about 9 percent more carbon will be stored in plants and soil with the acclimation of plants included in the model. While this amount is relatively small compared to different climate-carbon simulations performed over the years, the authors note that this acclimation phenomenon should not be ignored.

"This is carbon that might otherwise be released to the atmosphere as carbon dioxide and could further influence future climate change," said King, a researcher in ORNL's Environmental Sciences Division. "Our ability to accurately predict global change over the next several decades depends upon having a thorough understanding of multiple interacting factors, including plant respiration.

"The fact is that plants adapt to higher temperatures and their levels of respiration adjust downward."

While some previous climate-carbon simulations have included differentiation among vegetation types, none have incorporated an explicit time-dependent acclimation of plant respiration to increasing temperatures. ORNL researchers also looked at the influence of

temperature acclimation at both the local ecosystem and global scales.

ORNL's study looked at the period from 1930 to 2100, with and without acclimation of leaf respiration.

"All other things being equal, as they are in our simulations, more carbon stored in plants and soils corresponds to less carbon released to the atmosphere in response to climate change, and a weaker positive feedback between carbon and climate and a weaker amplification of additional warming," the authors write.

The paper concludes by saying, "There is also a need to better understand the control of respiration itself. The development, testing and adoption of a mechanistic and bio-chemical model of plant respiration are needed. To more reliably project plant respiration and climate-carbon feedbacks in a future climate, this modeling must incorporate response to temperature, including acclimation, at time scales from minutes to years."

On a global scale, plants release about 60 gigatons of carbon dioxide to the atmosphere each year as they carry out their life functions.

Other authors of the Perspectives piece were Carla Gunderson, Wilfred "Mac" Post, David Weston and Stan Wullschleger of the Environmental Sciences Division.

Source: Oak Ridge National Laboratory