Global worming: Earthworms add to climate change

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(Phys.org)—Earthworms are long revered for their beneficial role in soil fertility, but with the good comes the bad: they also increase greenhouse gas emissions from soils, according to a study published Feb. 3 in *Nature Climate Change* by a research team that includes a University of California, Davis, soil scientist.

The team found that earthworms do not, as was suspected, stimulate carbon sequestration in the soil, which helps to reduce greenhouse gas emissions. Instead, they actually increase greenhouse gas emissions through a variety of ways.

"There was a hypothesis that earthworms were having a positive effect on the greenhouse balance, but they don't," said co-author Johan Six, a plant sciences professor at UC Davis during the study who is now a professor at ETH Zurich in Switzerland. "I would never say you have to take out the earthworms because of greenhouse gases. It's just that you cannot give them credit for reducing greenhouse gases."

The scientific team was led by Jan Willen van Groenigen of Wageningen University in the Netherlands, and, along with UC Davis, included colleagues from Trinity College Dublin, and the International Center for Tropical Agriculture in Cali, Colombia.

The team gathered all relevant published research to date: 57 different experiments.

The research team then employed a statistical technique called meta-analysis to discern overall patterns in the data.

They found that the presence of earthworms increased nitrous oxide emissions from soil by 42 percent and carbon dioxide emissions from soil by 33 percent. But they found no indications that earthworms affect soil organic carbon stocks—the carbon stored within the soil.

According to the researchers, earthworms likely increase greenhouse gas emissions several ways: they mix organic plant residues in the soil, which may increase decomposition and carbon dioxide emissions; the earthworm gut acts as a microbial incubator, boosting the activity of nitrous oxide-producing microbes; and the earthworms, by burrowing through the soil, make it easier for greenhouse gases in the soil to escape into the atmosphere.

Small changes in soil greenhouse gas dynamics can have important repercussions for global warming, the researchers said. But lead author Ingrid Lubbers from Wageningen University said it is not yet clear to what extent the effects of earthworms on plant growth may negate earthworm-induced increases in greenhouse gas emissions.

"Our literature search also pointed out a large gap in the published studies," Lubbers said. "We need more experiments that include growing plants, as well as more long-term studies and more field studies before we can decide to what extent global worming leads to global warming."

Provided by UC Davis