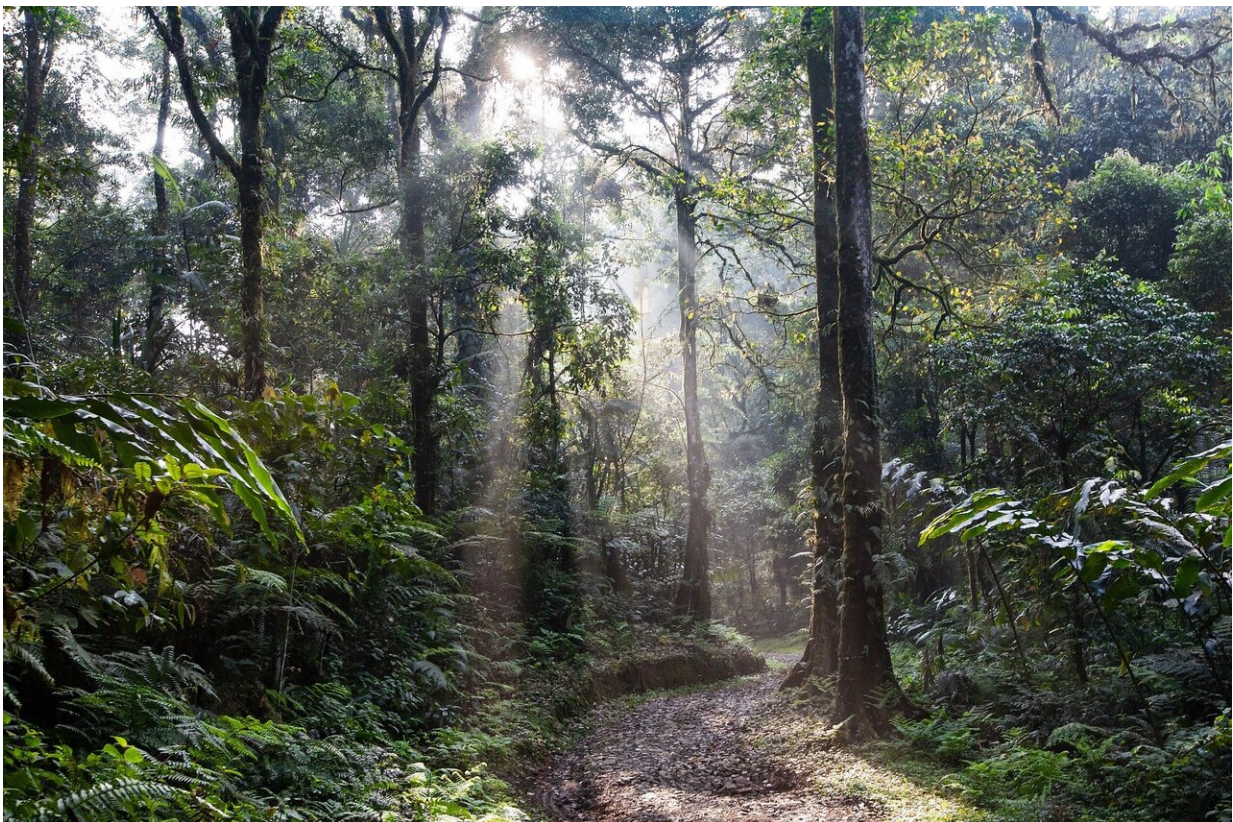


The impact of the soil microbiota on the mitigation of greenhouse gases in tropical forests

November 27 2019



Credit: CC0 Public Domain

The impact of the soil microbiota on the mitigation of greenhouse gases in tropical forests was the topic of a lecture given by Tsai Siu Mui, a

professor and vice-director at CENA-USP.

Greenhouse gases retain the thermal energy reflected by the Earth's surface. However, in soils of tropical forests, such as the Amazon, elements such as methane and [nitrous oxide](#) are actively recycled through biogeochemical processes.

"This was demonstrated by measuring subterranean microbial activities together with gas flows," said Tsai, who has been coordinating a study within the scope of the São Paulo Research Foundation—FAPESP Research Program on Biodiversity Characterization, Conservation, Restoration and Sustainable Use (BIOTA-FAPESP).

According to the researcher, microorganisms coordinate the ecological processes on which life depends, but little is known about their biodiversity. The research project she coordinates combines advances in nucleic acid sequencing and ecosystem biochemistry to investigate the control of the methane cycle throughout gradients of soil use in [tropical forests](#).

"To answer these questions, we're studying the genetic, phylogenetic, and functional dimensions of the biodiversity of bacteria and archaea in two fragments of tropical forest threatened by development: one in the East Amazon, in [the state of] Rondônia, and a reserve in the West Amazon close to Santarém, in [the state of] Pará," she said.

"These forests have a range of ecosystems, soil characteristics, and soil use history. We've already observed a reduction in [nitrous oxide emissions](#) when the natural fauna is freely present in the forest," she said.

The challenges of the Anthropocene

The need to find alternatives for the future has motivated a group of Brazilian and French researchers to look more than 500 million years into the past in an attempt to understand the many stages in the evolution of terrestrial life.

The study was presented on November by Magali Ader, a professor at the Institut de Physique du Globe de Paris, during FAPESP Week France.

"Facing the challenges of the Anthropocene will require [human societies](#) to adjust to [climate change](#) and find new energy sources. Some of these sources could be hydrogen, water, hydrocarbons, or rare elements and, for this, it is important to understand the Earth system well," said Ader.

The focus of the line of research conducted by Ader is on geological sediments in Brazil. The investigation involves the collaboration of Professor Ricardo Trindade's group, at the Institute of Astronomy, Geophysics, and Atmospheric Sciences of the University of São Paulo (IAG-USP).

The Thematic Project brings together more than 30 scientists from Brazil and France. The group's aim is to study the Earth system and the evolution of life during the Neoproterozoic era (between 1 billion and 541 million years ago), a period of significant changes in the planet's composition and dynamic, with the appearance of complex lifeforms and the shaping of continents, as well as important climate variations.

"In this work, we need to include scientists from different areas and that requires substantial funding," Ader said.

The greenhouse effect

Climate change caused by the emission of [greenhouse gases](#), such as

carbon dioxide (CO₂), nitrous oxide (N₂O) and ozone (O₃), is one of the challenges humanity faces in the Anthropocene.

Janaina Braga do Carmo, a professor at the Federal University of São Carlos, addressed the emissions resulting from [sugarcane production](#) in the State of São Paulo.

"Brazil is the biggest producer of sugarcane for the production of ethanol [renewable energy] and sugar in the world. Soil management, the use of nitrogen fertilizers and waste from ethanol production, as well as vinasse, filter cake, and post-harvest hay, can compromise the sustainability of cultivations, increasing greenhouse gas emissions," she said.

According to Carmo, another important issue is the expansion of sugarcane into grasslands, characterizing a change in land use, which can alter the dynamic and balance of greenhouse gas emissions in Brazilian agriculture.

"We're seeking to understand the greenhouse gas emissions during the process of converting grasslands into sugarcane plantations, considering normal management practices. The aim is to propose management alternatives capable of reducing emissions and increasing the sustainability of the production system," she said.

"After the first year of measures and analyses, we verified that the emissions resulting from sugarcane cultivation are greater than those that existed under grassland conditions. However, we still need to evaluate the nitrogen source used in the experiment," Braga told.

Provided by FAPESP

Citation: The impact of the soil microbiota on the mitigation of greenhouse gases in tropical forests (2019, November 27) retrieved 17 July 2024 from <https://phys.org/news/2019-11-impact-soil-microbiota-mitigation-greenhouse.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.