Biogeochemical processes determining carbon retention in soils in the context of the agroecological transition and climate change

Project description:

To meet the Paris agreement aim of limiting the mean global temperature increase by 2100 to 1.5ºC requires a decrease in greenhouse gas (GHG) emissions of around 3000 Gt CO_2-C equivalent by the end of the century. Soil organic carbon (SOC) sequestration has gained significant societal and scientific attention in recent years, as it is claimed to be a win-win option as when successful SOC increase provides various co-benefits. However, it is crucial to evaluate under which circumstances increasing SOC may enhance GHG emissions under a changing climate. Moreover, SOC residence time is very heterogeneous. SOC residence time can be studied by distributing SOC in different kinetic pools, which have contrasting average carbon residence times. Large uncertainties remain regarding the magnitude of the soil-climate feedback partly due to the inaccurate parameterization of the temperature sensitivity (Q_{10}) of SOM decomposition of C pools of distinct residence time. Thus, it is of crucial importance to investigate the Q_{10} of decomposition of distinct C-kinetic pools to foster our knowledge of the soil-climate feedback in an accelerating warmer planet. As agroecosystems represent over 40% of earth's land surface today, they must be part of the solutions put in action to mitigate climate change. There is a growing literature evaluating how agricultural practices can promote SOC sequestration. However, the utility of "carbon farming" – or the use of management practices to reduce greenhouse gas emissions – is currently limited by a poor understanding of SOC residence time dynamics and how carbon cycling processes are responding to current and future increases in temperature. Thus, the main objective of this PhD project is to: (1) determine how distinct agricultural practices influence microbial carbon use efficiency (CUE), (2) resolve the influence of agricultural practices on soil carbon quantity and quality and (3) evaluate the relationship between soil organic matter and microbial physiology at increasing temperatures (e.g. Q_{10} of respiration, growth, CUE).

Your profile:

A candidate with a master degree in biology, microbiology, soil sciences or related field. Who is motivated and that appreciates working in a collaborative multidisciplinary group. We expect a candidate that is communicative, curious, has good critical thinking and a positive attitude. The candidate should be an enthusiast for laboratory work and experimentation. Experience using a programming language (e.g. R or Python) is an advantage, but is not required.

Workplace and our offer:

The PhD candidate will be registered at the Doctoral school ABIES at the Paris-Saclay University and work at the INRAE Campus AgroParisTech (unit EcoSys). We are a small and committed team with a collegial culture. We value transparency and openness and believe that it is important to share our knowledge with others. You can expect to join a cooperative group to develop and learn new skills with the team. This PhD will be supervised by Dr. Luiz DOMEIGNOZ-HORTA et Prof. Claire CHENU.

The PhD salary is 2100 € brut/month in 2024 (2200 € in 2025 and 2300 € in 2026). The candidate should start in July 2024 or in September 2024 at the latest. We will start evaluating applications after May 20th and will consider each candidate's personal situation.

Applications:

Please send the below documents to luiz.domeignoz-horta@inrae.fr:

- CV
- A motivation letter explaining your motivations for this position (1 or 2 pages max.)
- Previous grades from the studies (bachelor and master)
- Contact details of 2 references (with email addresses or phone numbers)

If you are interested in this position do not hesitate to contact us before applying if you would like to have more information or ask further questions regarding the position or working group.