Project title - thesis topic :

## Candidatus Bathyarchaeia : major driver of the carbon cycle in continental wetlands?

Continental wetlands play a key role in the carbon (C) cycle. Although they cover less than 10% of continental areas, they store a third of the organic C in soils worldwide. The future response of continental wetlands to climate change, whether they will act as a carbon sink, mitigating greenhouse gas (GHG) concentrations, or as a carbon source, increasing GHG levels, depends on the fate of their organic carbon stock. Recent studies on microbial ecology in continental wetland soils revealed an unexpected diversity. Most of these microorganisms belong to uncultivated taxa for which we have little knowledge on their metabolism of organic C. Notably, a large proportion of Archaea, belonging to « *Candidatus* Bathyarchaeia », was observed in deep soils of continental wetlands. Previous studies in deep marine sediments evidenced the role of *Ca*. Bathyarchaeia in organic C degradation, especially its most recalcitrant pool. Yet, very few studies focused on the role of *Ca*. Bathyarchaeia in the continental realm so far and its contribution to the continental carbon cycle remains to be elucidated. The objective of this thesis will be to characterise the role of *Ca*. Bathyarchaeia in organic matter transformation in continental wetlands. It will be based on incubations of soil samples where a high abundance of *Ca*. Bathyarchaeia was previously observed (Coffinet, Dufresne et al., unpublished results). The methodological approach will combine organic geochemistry tools with analyses in microbiology, molecular biology and bioinformatics. Incubations will be set up with 13C labelled substrates to identify the organic C transformation pathways with the stable isotope probing (SIP) technique. A major analytic development is planned during the course of the PhD thesis based on high resolution mass spectrometry to analyse 13C-labelled biomolecules. This methodological approach will significantly improve the identification and versatility of biomolecules suitable for the SIP technique.
Keywords : carbon cycle continental wetlands microbial diversity stable isotope probing

The innovative aspect of this PhD thesis lies in the investigation of a microbial taxon understudied in continental wetlands whose contribution to the carbon cycle, in particular the emission of GHGs (CO2 and CH4), may be significant. Important methodological improvements in isotope analysis are also planned during the PhD thesis.

**Prerequisites :** Knowledge in analytical chemistry and/or microbiology
**Resources** : Analytical platforms of ECOBIO and OSERen in chemistry and microbiology.

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