

ESR 7 (WP2): Luiz Alberto Domeignoz Horta (luiz.domeignoz-horta@dijon.inra.fr) INRA, Dijon, France

Local supervisory team: Laurent Philippot and Aymé Spor

Project: Ecology of denitrifiers in soil

The project will specifically address how the ecology of the functional microbial communities can affect the emissions of N₂O. Indeed, previous studies suggest that the phylogenetic diversity and composition of the denitrifier community can explain partly the soil capacity to reduce N₂O emissions. For example, targeting the *nosZ* gene, the relative abundance of the two phylogenetically different groups proved to influence the N₂O sink capacity. The PhD project will include gas chromatography, metagenomics, metatranscriptomics, bioinformatics and advanced statistical analyses.

Specific tasks:

- To determine to which extent different management strategies at the same site can impact the microbial communities involved in the emission and reduction of N₂O. An experimental site comprising nine management strategies that differ in crop rotation, tillage depth, fertilization, straw incorporation and cover crop was chosen. Skills: potential denitrification and N₂O emission rate measurements, real-time PCR, denitrifier community diversity analyses by 454 pyrosequencing, bioinformatics, and advanced statistics. Collaboration with SLU.
- To determine the role *nosZ1 versus nosZ2* denitrifiers in soil N₂O reduction. This work will be performed in microcosms and could include some specific environmental factors (e.g. oxygen concentration, ammonia concentration, nitrate concentration) according to previous results from our group and/or the other NORA partners. Skills: potential denitrification and N₂O emission rate measurements, real-time PCR, denitrifier community diversity analyses by 454 pyrosequencing, bioinformatics, and advanced statistics. The work will be done in collaboration with, and during secondment to SLU.
- To understand the role of fungi in N₂O emissions using metatranscriptomics. This work could be performed at a common field site, where all of the INRA partners working with soil will be involved. Skills: potential denitrification and N₂O emission rate measurements, real-time PCR, mRNA extraction, Real time RT-PCR, bioinformatics, and advanced statistics. The mRNA extraction will be done in collaboration with, and during secondment to ECL.