

Master thesis/Engineer internship

QUANTIFICATION OF THE SOIL FUNCTION WATER PURIFICATION AND REGULATION – POTENTIAL AND CURRENT STATE

Soils play a key role in ecosystem functioning and provide a multitude of services to human societies. Although soils are mainly considered as the basis for the production of food, fibre and timber, they also sustain a wide range of functions related to climate and water regulation, water purification, nutrient cycling or habitat for biodiversity, which in turn contribute to the provision of ecosystem services. The quantification of soil functions is still a scientific challenge, because soil functions are not directly measured, but instead emerge from the combination of multiple soil properties used as indicators (e.g. soil organic carbon, clay content or bulk density). **The objective of this internship is to use the legacy data available in Southern France to quantify the soil function water purification and regulation.**

The approaches will rely on defining a set of perennial and dynamic soil properties that can be used as indicators of the soil water purification and regulation. There will be focus on defining a set of indicators that can account for both the current state of the soil function, or its potential state. The potential is characterized by perennial soil indicators that are not affected by management strategies, and refers to a maximum potential that a soil could offer by applications of optimal management strategies. The quantification of the function using the selected set of dynamic and perennial indicator can be tested using different strategies, for example using scoring functions (i.e. “more is better”, or “less is better”) or by decision trees.

After a thorough bibliography on the soil perennial properties and soil conditions that could impact water regulation, the student will develop different possible formalisms that could best represent the satisfaction of this function with the associated uncertainty. Such formalisms will be evaluated from a set of sites with estimated values of soil properties covering the Occitanie region that will be harvested from regional (RRP Occitanie), national (RMQS data) and global (WOSIS, LUCAS) datasets. The outputs of this work will be as far as possible compared with previous experimental data on the water regulation soil function that will be harvested in the Occitanie region.

The expected results are a set of evaluated formalisms for quantifying the water regulation function and the associated uncertainty and point-estimates of the soil function fulfilment. This study will be carried out within the framework of the Marie-Sklodowska Curie fellowship of Alexandre Wadoux.

Desired skills

- Good knowledge in pedology and ecohydrology.
- Knowledge in applied statistics.
- Knowledge in programming with the R or Python environment.
- Spatial analysis with geographic information systems (ArcGIS/SAGA).
- Interested to learn about soil functions and ecosystem services provided by the soils.

Internship data

- Supervision in French or English
- Level Master 2/Engineer
- 5-6 months – starting date around February-April 2023
- Allowance: €591,51 monthly
- 35h per week
- Onsite access to LISAH infrastructures

To apply: send a CV + cover letter to Alexandre Wadoux alexandre.wadoux@yahoo.fr and Philippe Lagacherie philippe.lagacherie@inrae.fr



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