INRAe

JOB POSITION

Modelling C - N – P cycling in forest ecosystems under climate and management constraints

The French National Research Institute for Agriculture, Food, and the Environment (INRAE) is a public research establishment. It is a community of 12,000 people with more than 200 research units and 42 experimental units located throughout France. The institute is among the world leaders in agricultural and food sciences, in plant and animal sciences, and is 11th in the world in ecology and environment. INRAE's main goal is to be a key player in the transitions necessary to address major global challenges. In the face of the increase in population, climate change, scarcity of resources and decline in biodiversity, the institute develops solutions for multiperformance agriculture, high quality food and sustainable management of resources and ecosystems.

WORKING ENVIRONMENT AND ACTIVITIES ▬▬▬▬▬▬ ▬ ▬ ▪ ▪

■ You will be welcomed in the research unit ISPA, within the research team of the project GO+ (Program GRAINE, Ademe[1], PRIMA, and *Région Nouvelle Aquitaine*) with Dr D. Loustau, L. Augusto and Pr. Jean-Christophe Domec. The ISPA unit is located close from the Bordeaux city and belongs to the INRAE centre Bordeaux-Nouvelle Aquitaine and Bordeaux-Sciences-Agro. The GO+ project[2] aim at projecting the effects of climate scenarios on French forests and interactions with management alternatives. The forest model GO+ has been extensively evaluated against observed data of energy, water and carbon fluxes as well as tree growth and production. However, despite their widely acknowledged interaction with CO_2 concentration increase on tree growth, the basic processes describing the Nitrogen and Phosphorus cycles in vegetation and soil are still not properly included. Relying on the results and synthesis achieved previously[3], the research proposed will aim at building and testing a fully coupled model of C-N-P cycles in managed forests (Pines, Oaks, Beech, Douglas fir…) and also in intercropped systems established to increase biomass production (trees managed at higher planting densities, or corn intercropped with trees). The results provided will be published in international scientific literature and disseminated through the *Forests-21* project portal.

■ You will be in charge of:

- An updated synthesis of the state of the art on the modelling of C N and P cycles in managed forests and in intercropped agro-forest systems.
- Model the main processes of the N and P cycles in the soil and vegetation with a coupling with C cycle (OM decomposition, adsorption, leaching, N fixation, fertilisation, photosynthesis, respiration, C allocation, growth, nutrient exportation by management and harvest)
- Collect, check and assemble a comprehensive dataset allowing to test the model(s) with biogeochemical data observed (Fluxnet, ICOS-Ecosystem, TRY database, ICP-Forest)
- Application of the model to simulate the C-N-P budgets of forests under climate scenarios and management alternatives
- Publishing and communicating your results in international scientific journals and at Geophysical Unions Assemblies (AGU, EGU).

---

[1] French Agency for Ecological Transition
[2] https://gmd.copernicus.org/preprints/gmd-2020-66/#discussion
[3] https://link.springer.com/content/pdf/10.1007/s10533-016-0274-9.pdf, ,
https://www.sciencedirect.com/science/article/pii/S0378112718303037

■ Special conditions of activity: You will be part of the GO+ project team at ISPA unit including two computing engineers, C. Moisy and C. Aluome, three scientists, J.-C. Domec, D. Loustau and L. Augusto, a project manager, S. Figuères, and you will interact with project partners: ICOS colleagues, Ademe, other INRAE research teams in Nancy (UMR SILVA) and Bordeaux, forest engineers (S. Martel, CNPF).

TRAINING AND SKILLS REQUIRED

■ Recommended training: Modelling in biogeochemistry of terrestrial ecosystems, PH D thesis
■ Knowledge required: Biogeochemistry, Nitrogen, Phosphorus, Carbon, Forest Ecosystems, Ecosystem dynamics.
■ Appreciated experience: Ph D thesis in biogeochemistry of terrestrial ecosystems (forests, grasslands)
■ Skills sought: Programming, Python language, fluent in English, open mindedness, working ~~as~~ in a team.

↘ Reception modalities	↘ How to apply
■ Unit: ISPA ■ Postal code + city: 33140, Villenave d'Ornon ■ Type of contract: fixed term ■ Duration of the contract: 30 months ■ Starting date: 1st October 2020 ■ Remuneration (initial): 2340 to 2510 € per month depending on experience.	■ Preselection: Send a motivation letter end a CV to : Denis Loustau By e-mail: denis.loustau@inrae.fr ✖ Deadline for applications: 31st August 2020 ■ Final selection: Virtual interviews will be organized in September for selected applicants