RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

INRAØ

université
PARIS-SACLAY

PostDoc position: **"Modelling carbon exports from watersheds at local to global spatial scales and at decennial to millennial temporal scales"**

In the framework of the PEPR FairCarboN project Deep-C, we offer a two-year PostDoc position in modelling erosion and fluvial exports of water, sediments, carbon and nutrients from watersheds.

Background:

Deep-C brings together a consortium of experimentalists and modelers to explore the coupled carbon (C) cycling in lakes and their watershed at centennial to millennial time scales. In particular, we are interested in how changes in climate and land use affect the C cycling in watersheds, and through changes in deliveries of water, sediments, carbon and nutrients also the C cycling in the connected lakes. This project involves lake monitoring network of 40 pilot sites in France. Analysis of lake sediment cores will allow for reconstructing changes in land cover and erosions rates over hundreds to thousands of years. Models will be used to reproduce the evolution of soil erosion, sediment, and carbon transfers at the pilot sites, to quantify the effects of land use and climate change on this evolution, and to extrapolate findings to regional, continental, and finally global scales. The latter will be supported by a network of international collaborators that provide additional data from other climate zones.

Job description

The tasks of the PostDoc will include:

- Providing simulated time-series of water, sediment, carbon and nutrient inflows for up to 40 lake observation sites (likely applying the model SWAT)
- Recalibration and use of the land surface model ORCHIDEE-C$_{lateral}$ to simulate terrestrial C cycling and fluvial exports of water, sediments, and C at regional scales in response to changes in climate and land cover
- Emulation of the land surface model ORCHIDEE-C$_{lateral}$ for application at global scale and to perform historical simulations over 100s and 1000s of years

The PostDoc will have the opportunity to write high-impact publications, for instance on how anthropogenic perturbations have modified the terrestrial C budget since the Bronze Age. This modeling study will fill a major knowledge gap, considering that land surface model simulations of anthropogenic perturbations of the global C cycle usually start with the Industrial revolution, thus ignoring historical perturbations through land use change and land use induced soil erosion that go back much further.

Profile of the applicant
- PhD in a field related to the research subject (Earth system science, environmental science, meteorology, etc.)
- Robust background in modeling (ideally land surface modeling and/or erosion modelling) and statistics
- Experience in coding (e.g. R, Python, FORTRAN)
- Good English skills, both in written and spoken language

Academic supervision:
Main supervisor: Ronny Lauerwald - UPSaclay, INRAe, UMR ECOSYS, France
Co-supervisor: Pierre Regnier - Université Libre de Bruxelles, Belgium

Scientific cooperation and mentoring:
Philippe Ciais - Laboratoire des Science du Climat et de l'Environment – Gif-sur-Yvette, France
Haicheng Zhang - Sun Yat-Sen University - Guangzhou, China
Nuno Carvalhais – Max-Planck-Institut für Biogeochemie – Jena, Germany

Work location:
The work place, INRAe/UMR ECOSYS (https://www6.versailles-grignon.inrae.fr/ecosys), is located in the new research & innovation cluster *plateau de Saclay*, in the southern suburbs of Paris, France. ECOSYS has a longstanding expertise in the research of land management impacts on terrestrial carbon and greenhouse gas budgets. Being linked to the Université Paris-Saclay (https://www.universite-paris-saclay.fr/en) and the CLand convergence institute (https://cland.lsce.ipsl.fr/), the successful candidate will profit from an international and interdisciplinary work environment. The PostDoc position includes a three-month secondment at Max-Planck-Intitut für Biogeochemie in Germany, where the PostDoc will work under supervision of Nuno Carvalhais and gain advanced skills in land surface model emulation and assessment of terrestrial carbon turnover times, which are pivotal for the research program outlined above.

Starting date:
April-May 2024 (here we are relatively flexible)

Salary: in accordance with national regulations. The position comes with full social and health benefits.

How to apply:
Applicants should submit a complete application package by email to ronny.lauerwald@inrae.fr. The selection process will start early March, but we will accept applications until the position is filled. The application package should include (1) a curriculum vitae, (2) statement of motivation, (3) PDF of PhD thesis, (4) names, affiliations, phone numbers, and email addresses of at least two references.