The Biogeochemistry and Modeling of the Earth System group (http://biogeo.mod.ulb.be/) at the Université Libre de Bruxelles (ULB) is inviting applications for

2 year Postdoctoral Research Assistant (PDRA) Position in Global Modeling of Carbon and Nitrogen Fluxes from Land to Ocean (EU-H2020 ESM2025 project)

Project Background:

The current generation of Earth System Models (ESMs) provides an important scientific basis to understand climate change and inform policy action, both with respect to mitigation and adaptation to global change. However, ESMs need further development to reach their full potential to thoroughly design and assess options necessary to meet the goals of the Paris Agreement (PA), including the environmental impacts of both the mitigation pathways themselves and climate change associated with these pathways. ESM2025 will develop such a new generation of ESMs through (1) improving their representation of climate and biogeochemical cycles; (2) implementing new interactions and couplings between different components of the Earth system, delivering an unprecedented holistic modelling framework to simulate future Earth system changes; (3) co-developing an innovative framework for linking Integrated Assessment Models (IAMs) and ESMs, enabling the development of geophysically-sound mitigation pathways. In this EU project, ULB will improve the representation of the Land-to-Ocean C and N fluxes and associated inland water GHG (CO₂, CH₄ and N₂O) emissions, thereby coupling for the very first time two key components of the Earth system.

The Position:

As stated in the 6th assessment report of the IPCC, ESMs are only beginning to represent the lateral transfer of carbon and nutrients from land to ocean through the global inland water network. As a result, the quantitative contribution of inland waters (streams, rivers, lakes, and reservoirs) to global and regional anthropogenic GHG budgets remains highly uncertain. Furthermore, virtually nothing is known regarding future trends in land-to-ocean C and N transfers, their environmental controls and their feedbacks on the climate system. Closing this knowledge gap is critical, as it will improve our ability to translate the physical science into policy relevant information.
To this end, we are looking for a PDRA to work on the global-scale modelling of the C and N cycles at the continent-ocean interface. The task will require the development of a river biogeochemistry model, and its coupling with the land surface-scheme of the IPSL Earth System Model (ORCHIDEE). This new branch of the IPSL-ESM will then be used to fully couple the global continental and oceanic C and N cycles in an ESM framework. In addition, model results will guide the construction of simple land-to-ocean C-N transfer functions to be embedded in the other ESMs involved in the project (CNRM-ESM, MPI-ESM, UK-ESM & NorESM). This research will be conducted in synergy with colleagues from the Institut Pierre-Simon Laplace (IPSL) near Paris, France.

The Environment:

Brussels is a lively, well-connected city with a large international community located in the very centre of Europe.

The project will combine the research strengths of the BGeoSys group at ULB and the Earth System Modeling group at the Institut Pierre-Simon Laplace (IPSL).

The BGeoSys group (Pierre Regnier, Haicheng Zhang, Sandra Arndt, Goulven Laruelle http://biogeomod.ulb.be/) at ULB focuses on the study of biogeochemical dynamics in different compartments of the Earth System and their role in shaping the present and past climates of the Earth, with a strong focus on the land-ocean interface. Its approach encompasses experimental, modelling and field work covering a large spectrum of temporal and spatial scales. The group has a longstanding experience in assessing inland and coastal water GHG budgets at regional to global scales.

The Earth System Modeling group of the IPSL Climate Modeling Center in France has a strong expertise in the modeling of the land (Philippe Peylin, Nicolas Vuichard, Philippe Ciais) and open ocean (Laurent Bopp, Marion Gehlen) biogeochemical cycles and their feedbacks on the climate system. They thus complement ideally the knowhow available at ULB and will be instrumental to achieve the full ESM couplings. Regular visits to Paris are to be anticipated.

The project will also be an integral part of the H2020 ESM2025 research approach and will thus provide a plethora of opportunities to interact with a large number of European institutions that develop some of the leading ESMs.

Your Profile:

The candidate will have a PhD in geosciences, climate science, environmental sciences, geography, limnology, hydrology, physics (or related fields). He/she will have with a proven, solid background in numerical modelling, scientific programming and data analysis. We are looking for candidates who can demonstrate excellent communication skills and proven ability to work independently with the ability to take the initiative. Knowledge in terrestrial and aquatic biogeochemistry and/or hydrology would be an asset. Eligible applicants must not have resided or carried out their main
activity (work, studies, etc.) in Belgium for more than 12 months during the 3 years preceding the appointment.

**Applications should be sent by email** to pregnier@ulb.ac.be and should include:

- a short cover letter specifying the motivation to apply for the position
- a short CV, including a list of publications
- contact details of two referees

The **deadline for application is 20 December 2021**, but the positions will remain open till filled.

The net amount of the fellowship will be ~€ 2450/month (minimum, exact salary depends on experience). Further benefits are:

- EU Citizens and citizens from countries that have a bilateral social security agreement with Belgium: social security coverage including medical insurance, unemployment benefit, pension, maternity leave and child benefit.

- Non-EU Citizens from countries that have no bilateral social security agreement with Belgium: social security coverage including medical insurance, maternity leave and child benefit.

- Insurance against accidents in the workplace.

- Tax exemption.

- Low-cost private hospitalization insurance.

- On-site services at the ULB: medical centre, university hospital, sports centre, subsidized restaurants, cultural centre, childcare, holiday camps for children, etc.

For informal enquiries please contact Prof. Pierre Regnier (pregnier@ulb.ac.be)