



POSTDOCTORAL RESEARCHER IN HYDRO-GEOCHEMICAL DYNAMICS OF RARE EARTH ELEMENTS (REE) IN CONTAMINATED RIVER BASINS (M/F)

Fixed term contract (24 months) | Fulltime/40h | Belvaux

Context

The Luxembourg Institute of Science and Technology (LIST) is offering a post-doctoral position in the framework of a newly funded international project on the ecotoxicology of Rare Earth Elements in aquatic systems (ECOTREE).

ECOTREE is funded in the framework of the PRCI 2016 (International and Collaborative Research Program between national research funds from France and Luxembourg). ECOTREE is a truly interdisciplinary project, covering large parts of the REE life cycle, from anthropogenic REE geochemistry, REE dynamics in (waste)water systems, REE speciation and related bioavailability, to REE trophic transfer and environmental impact assessment at different biological levels – all of this from a Life Cycle Assessment perspective. The project stands as a milestone towards the ecotoxicological and mechanistic understanding of REEs in freshwater ecosystems and will help to define appropriate strategies for a better management of their predicted increase.

The proposed post-doctoral research focuses on the temporal dynamics of REE speciation in contaminated rivers. The natural cycle of REE is significantly disturbed in river basins impacted by human activities and the contribution of anthropogenic REE (AREE) to surface waters interferes with geogenic REE sources. The composition of the AREE pool is site-dependent and, for a given river system, controlled by the different anthropogenic contributions to the river. However, the identification of the origin of AREEs in river systems and the quantification of their impact on ecosystems is still challenging, in particular for AREEs that may derive from various industrial and urban activities. It is critical to understand the mechanisms that regulate the fate of AREEs in contaminated rivers in close relation to water quality/quantity changes. These mechanisms remain poorly understood and have been little investigated at basin scale in rivers with AREEs. Here, the focus is set on a more realistic understanding of the hydro-geochemical processes that control the partitioning of REEs between the different compartments of the water column under changing hydrological conditions (i.e. from low flow to flood events).

Description

A major asset of this project is the combination of quantitative (hydrology) and qualitative (geochemistry) approaches to estimate the biogeochemical processes involved in the temporal dynamics of the REE fractionation and speciation from plot to river basin scales.

More specifically, the candidate will be in charge of two principal objectives:

- Studying the impact of the characteristics of the wastewater treatment plant effluents on the mechanisms that control the REE exchanges and fractionations between all the compartments of the river water (bottom sediment/interstitial water in the hyporheic zone, suspended/colloidal/dissolved loads) in the river at plot scale

Job reference: ERIN-2017-016

Application file:

- A CV
- A motivation letter
- Any other document you may think useful to be considered in your application file

Apply online: [ERIN-Job offer](#)

Your working environment

The research department

With its multidisciplinary team, the Environmental Research and Innovation department (ERIN) brings together the necessary interdisciplinary knowledge and skills to tackle the major environmental challenges of our time: climate change mitigation, ecosystem resilience, sustainable energy systems, efficient use of renewable resources as well as environmental pollution prevention and control.

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- Determining the processes of REE fractionation and speciation under contrasted hydrological conditions at river basin scale. The partitioning of REEs over particulate, colloidal and true dissolved loads will be studied in the water column by fractionation using filtration and ultrafiltration techniques

The selected candidate will be in charge of additional tasks:

- Stream water and sediment sampling at various time scales, including high-frequency resolution, using ISCO autosamplers and the installation of an in situ colloidal pumping mechanism
- Sample preparation in clean conditions: separation of the different water compartments using filtration and ultrafiltration techniques
- Complete chemical composition analysis (temperature, pH, EC, alkalinity, anions, cations, trace elements, redox potential, turbidity, suspended solids, nitrogen species, dissolved organic matter concentration and quality...) in the suspended, colloidal and dissolved loads
- Determination of O and H isotopic ratios in water
- Data processing and analyses for publication in highly ranked international peer-reviewed journals (two publications are targeted within the framework of this post-doctoral position)

The candidate will work in the CATchment and eco-hydrology research group and will closely collaborate with researchers of the Environmental Health research group. This position is envisaged to start no later than January 1st 2018.

In the framework of the ECOTREE project, this position will be complemented at the University of Lorraine by two additional positions: One PhD project will focus on the "Origin, behavior and fate of Rare Earth Elements in wastewater treatment plants and receiving river water"; an additional post-doctoral position, which focus at "the speciation and partitioning of REEs in waste- and river waters and experimental ecotox media using analytical speciation techniques and geochemical modelling".

Profile

Education

- PhD degree in environmental sciences with a focus on contamination in river systems and/or trace element behaviour in the critical zone
- A recognized track record in the scientific field of their PhD. Selection criteria will focus on the scientific quality of accepted publications

Competencies

- A strong experience in laboratory work and a strong motivation for field work
- Any experience in using ultrafiltration techniques and in preparing/analysing environmental samples for trace element concentrations (ICP-MS, ICP-OES) and/or stable isotopes (Laser Spectroscopy, IRMS) will be considered as an asset

Language

- Excellent skills in speaking, reading and writing English
- High motivation and communication skills within an international multi- to interdisciplinary research environment

Other requisition

- Class B driving license