

PhD position in eco-hydrology

Hydrological constraints on Rare Earth Elements dynamics in the regolith-plant continuum

The Luxembourg Institute of Science and Technology (LIST) is offering a fully paid PhD candidate position in the framework of a newly funded Doctoral Training Unit (DTU) in Water Sciences: Hydro-CSI.

The doctoral programme HYDRO-CSI is funded in the framework of the PRIDE scheme of the Luxembourg National Research Fund (FNR).

The main objective of the DTU is to train a new generation of highly skilled experts with a view to contribute to solving some of the most pressing challenges related to water resources research and management: hydrological system complexity, non-stationarity of boundary conditions, high-frequency monitoring of environmental processes, global change impact assessment. This position is envisaged to start between January 1st 2017 and 1st May 2017 and will extend over a maximum duration of 4 years.

The PhD candidate will be part of the Water Safety and Security Unit at the Department of Environmental Research and Innovation (ERIN) at LIST and will work in the Catchment and eco-hydrology research group. Furthermore, the PhD candidate will be affiliated with Wageningen University (NL).

The general theme of this PhD project is on the temporal dynamics of water exchanges inside the critical zone. The focus is set on a more realistic understanding of the transpiration process in forest ecosystems. Despite the importance of plant transpiration in the water cycle, the mechanisms that regulate its contribution are still poorly understood and have been little investigated.

Job description:

We propose an interdisciplinary research project that will focus at a better understanding of processes controlling water exchanges at the regolith-plant interface. More specifically, we intend to focus on one of the most prominent blueprints in recent hydrological processes research: the two water worlds concept. We plan to revise this concept using a new multi-tracer approach with a view to propose a more holistic understanding of the critical zone's functioning. Given the intricate complexity of plant transpiration, we propose an experimental validation of the fundamental assumptions of the use of Rare Earth Elements, in combination with stable (O, H) isotopes as a proxy of water mixing and exchange within the critical zone.

One of the main pillars of this PhD project consists in the combination of quantitative (hydrology) and qualitative (geochemistry) approaches to estimate the biogeochemical processes that control the temporal dynamics of the water exchanges between the regolith and the plants. More specifically, the candidate will be in charge of:

- *making a state-of-the-art analysis relative to the general objectives of the project and the elaboration of the working hypotheses,*
- *designing and implementing short- to long-term laboratory and field experiments in line with the formulated hypotheses,*
- *collecting water samples in different environmental media (groundwater reservoirs, soils, plants...) at various time scales, including high-frequency resolution,*
- *preparing and analysing solid and water samples for complete chemical composition (major elements, Rare Earth Elements, nutrients, pH...), isotopic composition including stable isotopes (O, H) as well as mineralogical composition (SEM/EDX),*
- *proposing relevant statistical approaches using multi-tracer datasets for improving the existing hydrological/geochemical concepts of water exchanges between regolith and plants,*
- *rigorously processing and analysing collected data for publication in highly ranked international peer-reviewed journals.*

Eligibility:

- *No restrictions apply as to the nationality of the candidates*
- *Candidates may not have received a doctorate prior to their application to this position*
- *Candidates shall be available for starting their position no later than 1st May 2017*

Qualifications:

- *Master (or similar) degree in Environmental sciences with a focus on Surface Geochemistry or Geo-botany*
- *Excellent skills in speaking, reading and writing English*
- *High motivation to be part of an international DTU and to perform high quality research*
- *Any experience in using and analysing trace element concentrations and/or stable isotopes (TIMS, Laser Spectroscopy, MC-ICPMS, IRMS) or using SEM/EDX technique in environmental samples (water, soil, wood, rock...) will be an asset*
- *Class B driving license*

Place of employment and main place of work:

- **Primary supervisor at degree awarding institution Wageningen University:** Prof. R. Uijlenhoet
- **Co-supervisors (at Wageningen University):** Associate Prof. R. Teuling, Associate Prof. V. Bense
- **Primary supervisor (at LIST):** Dr. C. Hissler
- **Primary work location:** Luxembourg Institute of Science and Technology (LIST)
- **Duration and location of secondment/s:** Regular stays at the Wageningen University will be proposed for theoretical and methodological developments (up to 50% of total project duration)

Application procedure:

The application can be submitted via LIST's job portal: <http://www.list.lu/en/jobs/>. If there are any questions regarding the procedure please contact our HR office (jobs.list.lu). The application must include:

- *A motivation letter oriented towards the preferred position and experience*
- *A current CV, which includes full contact details*
- *Two reference letters or full contact details of the two referees*
- *A copy of master (or similar) degree that allows for the enrolment on a doctorate degree*

Applications will be reviewed until all positions are filled, with the final date of submission being 31st October 2016. An assessment committee will be appointed to review the applications and candidates selected based on Network-wide guidelines, which aim to ensure equal opportunities. Shortlisted candidates will be invited to interview either in person or by Skype.

The main criterion for selection will be the existing skills, knowledge and research career potential of the applicant, match with the project, and fulfilment of the above mentioned qualifications. Candidates from all backgrounds are encouraged to apply.

The LIST is committed with equality of opportunities and gender balance.

All open positions are published and recruitment is performed according to international best practices. All PhD candidates are joining LIST under an employment contract for the full duration of their PhD project.

The HYDRO-CSI DTU subscribes to the principles of research integrity within the framework of the FNR funding scheme (FNR Research Integrity Guidelines). These rules rely on the European Code of Conduct for Research Integrity, the Singapore Statement on Research Integrity and the Montreal Statement on Research Integrity.

PhD candidate mobility will consist in secondments to partner universities, as well as private companies in case of potential for collaboration on applied aspects, technological developments or business opportunities (e.g. in the framework of a Private Public Partnership).