FICHE PROJET

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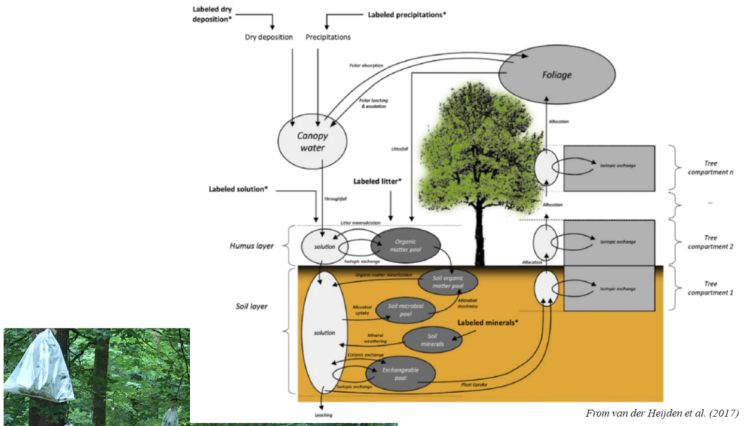
FORFUS-RT1.3

PhD project on the exchange of water, trace elements and nutrients in the regolith-tree-atmosphere continuum of forest ecosystems, part of the "Forest function under stress" doctoral training unit (FORFUS).



From van der Heijden et al. (2017)

This project is part of the doctoral training unit FORFUS: Forest function under stress

Inspiration

The nutritional capacity of forests in relation to global change is a concern for future forest management. Its study requires more appropriate approaches to assess and predict the production potential of forest ecosystems and their responses to actual and future environmental and human-induced pressures. In this context, trace elements have recently demonstrated their added value in helping us understand the nutritional interactions between the biotic and abiotic compartments in Luxembourg forests. The main objective of this study is to assess the interaction between the water storage seasonality and the spatio-temporal variability of the trace element pool mobilities from the litter to the deeper regolith layers. The main research question relates to the connectivity/synchronicity of the chemical and isotopic dynamics that make their way from below the ground to inside the trees and that is controlled by water accessibility to the tree and driven by drought frequency and intensity.

Innovation

The PhD candidate will combine quantitative and qualitative developments to study the seasonal evolution of the water chemical and isotopic composition in the regolith-tree-atmosphere continuum at diverse temporal scales over two vegetative periods. He/she will develop a research project on the quantification of REE and/or Pb and/or Sr exchanges in different compartments of an experimental forest considered a long-term critical zone observatory in Luxembourg. This PhD project will apply the Nutsfor model to estimate the budget of the selected trace elements for different tree species at the plot scale and will contribute to a more precise use of these environmental tracers to understand nutrient cycles in critical zones of forests.

Impact

The major challenge of this FORFUS sub-project is to better understand the biogeochemical functioning of forest ecosystems with low mineral fertility to better predict their evolution under multiple constraints.

Partenaires

Administration de la nature et des forêts (LU) , BOKU (AT) , Center for International Climate Research , Delft University of Technology (NL) , Groupement des Sylviculteurs a.s.b.l (LU) , INRAE (FR) , Luxembourg Institute of Socio-Economic Research (LU) , Musée national d'histoire naturelle Luxembourg , National Institute of Statistics and Economic Studies (LU) , Swedish University of Agricultural Sciences (SWE) , The National Institute for Public Health and the Environment (NL) , Université Catholique de Louvain (BE) , University Göttingen (DE) , University of Edinburgh (UK) , Université du Luxembourg (LU) , University of Naples (IT) , University of Tartu (EE) , University of Trier (DE) , Sapienza University Rome (IT) , Wageningen University (NL)

Support financier

Fonds National de la Recherche Luxembourg , Luxembourg Institute of Science and Technology

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