Consequences of global change on organic matter and nutrient biogeochemical cycle in forested ecosystem; comparison between in-situ soil solutions and experimental leachate from soil column.

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Résumé

Forest soils represent the largest carbon reservoir in temperate environments, but this can be destabilized by climate change or silvicultural practices. The study of dissolved organic matter (DOM) in soil solutions is key to understanding organic matter reactivity as well as biogeochemical nutrient cycles.
One method for pseudo-characterizing this DOM is UV-visible absorbance and fluorescence spectroscopy. By signal processing, indicators of this DOM can be calculated and multivariate analyses with other geochemical parameters can be performed. In this way, certain processes can be highlighted, such as the stabilization/degradation of soil organic matter, organo-mineral interactions, etc.

This study was realized with soil solutions from a forested ecosystem monitored since 1986 by the Observatoire HydroGéochimique de l'Environnement (OHGE; Strengbach watershed) in the Vosges mountains. Those samples have been taken each 8 weeks at four different depths (5, 10, 30 and 60 cm) under spruce plots (declining, healthy and new plots).

In addition, percolation experiments on soil columns, with soil coming from the same site have been designed. The objective was to decrease the complexity of natural ecosystems and to identify and deconvolve experimentally (under controlled conditions) different processes affecting OM. For example, drought conditions have been applied and studied. Significant variations have been observed concerning the characteristics and nature of DOM.

Cross-laboratory field studies using innovative chemiometric methods will not only help us better understand the processes governing biogeochemical cycles, but also enable us to observe and predict the consequences of global change.

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Mots-Clés: forested ecosytem, soil organic matter, drought, geochemical cycle, nutrient