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# Impact of a pest invasion on a forest ecosystem; soil reactivity and soil solution chemistry. Strengbach Watershed (Vosges Massif)

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## Résumé

Forests are sometimes considered as renewable and sustainable energy source by the wood production. However, they are subjected to acid rain, climate changes, intensive managements, loss of soil fertility, parasites, who can lead to greater vulnerability and forest declines. During the summer 2013, a spruce plot, located on the Strengbach catchment observatory (OHGE) and monitored since decades, was strongly attacked by parasite (bark beetle) leading to the progressive fall of bark, followed by tree death. Throughfalls are sampled and analysed bi-weekly and the soil solutions (at 5, 10, 30 and 60 cm depth) each 6 weeks.

This study aims to investigate the modifications of throughfalls and soil solution in relation with different perturbations including acid rain deposits and the recent beetle attack. In addition to chemical analyses, the Sr isotopes were regularly measured, as well as the organic matter characteristics (UV-Vis, fluo spectroscopy).

Long-term trends have been identified for pH, SO<sub>4</sub> and NO<sub>3</sub> in relation with decrease of acid rain since 80's.

The chemical compositions of the soil solutions were quickly impacted after the bark attacks. Nitrate C<sub>o</sub> increased significantly and rapidly after the event because of reduced plant uptake with an increase of N-mineralization and nitrification rate. The concentrations of major cations such as Mg, Ca, Al, as well as Sr, Ba and Mn also increased in the soil solution in relation to increasing desorption. Sr isotopes show a change in the source of nutrients. Although the total organic matter content has not changed significantly, its characteristics (cyclicality, humification, molecular weight) show evolutions.

The variations reached maximums at fall 2015 and a chemical return to initial values after 4.5 years.

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\*Intervenant

**Mots-Clés:** Forest, soil solution, Sr isotopes, pest attack