TECHNISCHE UNIVERSITÄT DRESDEN

Fakultät Umweltwissenschaften – Institut für Bodenkunde und Standortslehre

Professur für Standortslehre und Pflanzenernährung

Topic for master thesis (in cooperation with Sachsenforst)

Mineralization of sulfur and nitrogen in forest soils in Saxony

Sulfate (S) and nitrogen (N) deposition with acid rain was a serious problem for forest ecosystems in North and Central Europe during the 1970-90s causing severe impacts on forest ecosystems. In the following decades, it was assumed that S and N availability in European forests is sufficient and, thus, not a problem. Nevertheless, recent reports of clearly decreased S stocks in forest soils and of reduced S foliar contents point to the potential of arising S deficiencies in European forests that in the past were subject to elevated rates of S deposition. Consequently, the S nutritional status in forest ecosystems is increasingly relying on internal S cycling (in particular mineralization) and S supply from mineral sources.

Whereas atmospheric S deposition decreased considerably during the last 30 years, deposition of N is still high and contributes to eutrophication and acidification of forest ecosystems. It is not clear how the imbalances of N and S supply in the soil will influence plant availability and root uptake of nutrients.

Therefore, this master thesis will investigate the subsequent supply of plant-available N and S compounds released during mineralization of organic matter in forest soils. In the laboratory, this will be realized by open-system incubation experiments and using samples of organic layers and topsoils taken at different forest sites in Saxony/Germany. The incubated soil will be leached periodically with percolation solution and leachates will be collected during the experiments. The leached solution will be analyzed for total concentrations of S and N as well as mobile fractions of these elements. The supply from O-layer (efficient S and N cycling) is expected to be considerably different from mineral topsoil. The aim of the master thesis is the characterization of S and N mobilization during mineralization by considering site-specific differences in forest nutrition.

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