Project Database of ICP Forests

PROJECT DESCRIPTION

PROJECT INFORMATION

Project title:	Transition of sulfur nutrition from excessive supply to potential deficiency in spruce forest ecosystems in Central Europe
Project ID:	197
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PROJECT DESCRIPTION

Atmospheric sulfur (S) deposition during the 1970-90s caused distinct negative effects in forest ecosystems of North and Central Europe. Therefore, the role of S in forest nutrition was mainly seen as a surplus nutrient, or even pollutant, resulting in the assumption of a long-term sufficient S supply for forest growth. Nonetheless, recent results from European forest monitoring have revealed a considerable decrease of S stocks in forest soils and clearly reduced foliar S contents in different tree species, especially Norway spruce. These effects are related to the marked decrease of atmospheric S deposition and gradual recovery from formerly high S deposition. Consequently, the S nutritional status in forest ecosystems is increasingly relying on internal S cycling (from mineralization) and S supply from mineral sources. In addition, other environmental factors, partly related to climate change (i.e. increased levels of atmospheric CO2 and temperature) may induce changes in forest nutrition, especially with regard to nutrient stoichiometry in plant and soil.

Our project focusses on the understanding of the transition of S nutrition in Norway spruce (*Picea abies* L. Karst) forests in Germany from excessive supply to the point of potential deficiency. As this process of decreasing S supply depends on former amounts and forms of S input, the test sites comprise Norway spruce forests with contrasting S supply in terms of quantity, temporal changes and atmospheric/lithogenic sources. Thus, different sources for S supply may lead to differences in S incorporation in wood and needles. The degree of S supply and changes in S nutrition of trees will be investigated in different ecosystem compartments: mineral topsoil, forest floor (O-layer), stem-wood (tree rings), and foliage (needles of different age). Because of the interdependency of element cycles in ecosystems, specific element ratios of C, N, P, and S will be included in this analysis. Based on stoichiometric ratios, we aim to derive conclusions on nutrient supply(surplus/deficiency) of (1) past periods and (2) under current conditions, and (3) what can be expected for the future development of the nutrition status. This will give insight into basic processes and controls as well as provide valuable information for nutrient management in forestry.