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DEPOSITION AND LEACHING AT FOREST STANDS IN SUMAVA Mts.

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Abstract

Bulk deposition, throughfall, and soil water samples were collected in Sumava Mts. Czech Republic from 1988 to 1992. Canopy exchange budget and soil water output for the major ions at mountain spruce forest stands were estimated. The deposition and output from soil of determinated ions differ greatly among forest stands. The positive ecosystem budgets were calculated for most elements.

1. INTRODUCTION

Knowledge of the transfer and budgets of ions in forest ecosystems is important for the estimation of cycling rates and long-term effects on biological systems. The prevalent part of Bohemia is known for heavy acid deposition. Sumava Mts. are a mountain range situated in South Bohemia, relatively the most protected area. Nevertheless, in the Sumava National Park more than one third of the forest is damaged.

2. STUDY SITES

The forest stands were situated at elevation range from 800 to 1300 m. The vegetation is dominated by Norway spruce. The soils are brown forest soils and podzols developed on the slope deposits derived from gneiss. Mean annual precipitation sum is about 950 mm, mean annual temperature reaches about 4.8 ^{o}C.

3. METHODS

The samples were collected by using bulk vessels with separating of coarse particulates and lysimeters for mineral soil leachates approximately monthly. All water samples were analyzed for pH by combined glass electrode and specific conductance with conductivity cell. Anions were determined by isotachophoretic method and cations by ICP method.

4. RESULTS AND DISCUSSION

Sulphates, nitrates and potassium dominated in bulk deposition on the all stands (see Figure). With elevation is enhanced precipitation and pH- values decreased in bulk deposition, but reach the higher value in throughfall. Flux of major cations in the throughfall was higher than in bulk deposit on the lower stands. Oposite effect was observed at elevation above 1000m. Dry deposition was calculated about 10% of total deposition. Some results confirmed prevailing wind direction and flux of major ions from bulk, throughfall (wash-effect) and leaching from needles. The Sindlov throughfall of potassium was the highest. Chronical exposure of canopy by sulphates and nitrates are reflected by higher throughfall values. Tremendous variability in percolated volume were observed both temporally and spatially. Percolation of water at stands Nove Hute and Vodarna occurs mainly after snowmelting or after heavy rain. At Sindlov leaching was prevented due to higher water retention capacity of humus horizon and low snow accumulation. In most cases the concentrations of ions in lysimetric waters were independent on the water volume, making the water flow desicive for the budget. The leachability in forest soils differs greatly among ions but positive budgets were calculated for the most of the ions. There is net release of some metals from the B horizon at stands Nove Hute and Vodarna. The only metals with a net outflow throughout the A and the B horizons of these stands was Al.