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# Experimentally altered soil chemistry affects decomposition rates in mountainous forest ecosystems

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During the 20th Century, acidic atmospheric pollution has strongly affected forest and surface water ecosystems across Northern hemisphere. Increased sulphur (S) and nitrogen (N) depositions has led to depletion of soil buffering capacity resulting in soil acidification and declines in ecosystems vitality. Although S deposition rapidly decreased in the last decades, N deposition is still significant and together with higher atmospheric $CO_2$ affects forest ecosystem dynamics. Besides changes in mineral soil chemistry, atmospheric deposition affects decomposers activity. Litter decomposition is a key process in carbon cycling. Soil heterotrophic respiration plays a pivotal role in gross carbon flux to the atmosphere. Whereas S deposition is able to retard decomposition activity, enhanced N availability might have ambivalent effects on litter decomposition. According classical theory N should in early phase stimulate and in late phase retard decomposition.

Since 2014 we have been conducting experimental simulation of enhanced atmospheric S and N depositions in forests in the Ore Mts. - an area historically affected by severe acidification and eutrophication. At each forest stand (Norway spruce and European beech), soil acidity and N availability were manipulated for 4 years by systematic addition of S and N treatment solutions. At each experimental site, sixteen 3 x 3 m plots were assigned to control (Ctrl), nitrogen (N), acid (S) and acid + nitrogen (S+N) treatments in a randomized blocked design, thus four replicates per treatment were available. The treatment dose was equivalent to 50 kg S $ha^{-1}$ $year^{-1}$, while the additional water addition was equivalent to 2.5 % of average annual rainfall. Nitrogen treatments gave an input of 50 kg N $ha^{-1}$ $year^{-1}$.

In 2017 we buried bag-packed standardized substrates (Rooibos and Green Tea) and native litters (spruce needle and beech leaves) into organic horizons of treated plots. During two years we were continually retrieving tea- and litter- bags and measured both quantitative (litter mass loss) and qualitative parameters (C, N and lignin content). We present preliminary results of experiment. The results show S and N deposition effect on decomposition rate and further qualitative changes of decomposed materials during decomposition. Furthermore, tea bag experiment results were in agreement with concurrent measurements of soil respiration.