



Project BiSiAL – Biogenic silicon in agricultural landscapes

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Silicon (Si) accumulation in plants increases their resistance against abiotic (e.g., water deficiency) and biotic stresses (e.g., fungal infection). Induced mainly by Si exports through harvesting and increased erosion the amount of plant available Si decreases in agricultural soils (anthropogenic desilication), and thus the quantification of plant available Si in these soils is of fundamental importance. Biogenic Si (BSi) represents an important source of plant available Si, because its solubility is much higher compared to minerogenic Si. Based on a combination of microscopic and spectroscopic methods (confocal laser scanning microscopy, REM-EDX, micro-FTIR-spectroscopy) the quantification of BSi pools (phytoliths, diatom frustules, testate amoeba shells) and analyses of physicochemical surface properties of these BSi structures will be realized in project BiSiAL – objectives that cannot be obtained with established alkaline extraction methods. Furthermore, little is known about Si balances (Si pools, Si inputs, Si outputs) of agricultural biogeosystems. Thus, the objectives of project BiSiAL are (i) to compile comprehensive Si balances of agricultural biogeosystems, (ii) to identify factors that influence Si balances (degree of erosion, BSi pools, etc.), (iii) to analyze temporal developments of the plant available Si fraction and BSi pools in agricultural soils, and (iv) to quantify BSi pools and qualitatively characterize BSi structures in agricultural biogeosystems. The first results of project BiSiAL indicate that desilication of agricultural systems due to harvesting is especially controlled by crop biomass (the higher the biomass the higher the Si export), which in turn is controlled by (long-term) crop management. The results of project BiSiAL will contribute to a fundamental understanding of anthropogenic desilication and allow practice-oriented recommendations for its restriction or prevention.