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Neue Ansätze zur Quantifizierung und Charakterisierung pedogener Minerale und Mineraltransformation

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Titel
Improved alkaline extraction method for biogenic silica determination in volcanic soils

Abstract
Here we present the first results obtained with an innovative technique aiming at measuring biogenic and lithogenic amorphous silica contents in soils developed on basaltic parent material. Biogenic silica (BSi) has become important to many research domains like soil science, biogeochemistry, aquatic sciences, palaeoecology, and agricultural sciences. In most soils, BSi is a small but highly reactive Si pool in comparison to lithogenic Si sources. This high reactivity makes it a key component of the soil-plant Si cycle. In the last decade, the continental cycle of Si has been increasingly studied, because of (1) the importance of Si as a nutrient for plants and diatoms (studies include e.g., impact of land-use change, export through harvest, influence on crops resistance to various kinds of stress) and (2) the major role of Si during chemical weathering. Constraining Si reservoirs in soils is, however, not an easy task due to the ubiquity of Si. Many methods have been developed to quantify BSi content in soils (mostly alkaline extraction techniques) and other Si pools in soils (e.g., mobile Si, adsorbed Si, … with the sequential Si extraction by Georgiadis et al. 2013 [1]). BSi extraction methods that are based only on solubility are, however, difficult to apply to environments where large amounts of lithogenic amorphous or poorly crystalline aluminosilicates are present, like e.g. in volcanic soils, as their solubility is close to that of BSi. In order to study the soil/plant Si cycle in such soils, leaching methods, quasi-continuously analysing both the dissolution kinetics and the chemistry of the dissolving phases, provide better control of the dissolving Si sources. Several authors successfully used methods similar to the one applied here on various materials. This is however the first study that applies such method with quasi-continuous monitoring of released elements on the challenging material that is volcanic soils.

Literatur
[1] Georgiadis A., Sauer D., Herrmann L., Breuer J., Zarei M., Stahr K., 2013. Development of a method for sequential Si-extraction in soils. Geoderma, 209-210, 251-261.