Chemical and isotopic composition of soil solutions from cambisols in Styria (Austria) - Seasonality, evaporation and interstitial distribution

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In most natural surroundings soil solutions are primary gained from the uptake of meteoric water. Subsequently infiltration, capillary exchange, bioresponse, evaporation etc. result in complex and individual gas-water-solid systems. Knowledge on the isotopic and chemical evolution of soil solutions and its interstitial distribution is highly relevant for environmental and forensic studies, but respective systematic and combined field and experimental studies a rare.

Therefore we investigated the composition of solids and interstitial solutions of individual horizons for three cambisols in Styria (Austria). The solutions were separated from the soils by compaction method at hydraulic pressures of 27.4 and 54.9 MPa, corresponding to respective matric potentials (mp).
The soils consist mainly of quartz, chlorite, muscovite, plagioclase with associated silicates like kaolinite and vermiculite, but without a significant vertical variability. The pH of the separated soil solutions typically increases with depths and elevated mp. Concentrations of dissolved ions such as Ca^{2+} and Mg^{2+} increase at high mp, which correspond to higher δD and $\delta^{18}O$ values. Lab experiments for evaporation and wetting indicate a systematic correlation of the combined isotope data and solution chemistry. The field-related and experimental results are discussed in respect to the impact of seasonality, evaporation, and mp-related interstitial distribution of the (isotope) geochemical composition of the separated soil solutions.

X-ray tomography links macroscopic silicate fabric and AMS fabric

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Anisotropy of magnetic susceptibility (AMS) has been widely applied to gain insight into magnetic fabrics in granitic intrusions, basalt lava flows and dikes. In order to draw this generic link, it is assumed that the AMS fabric reflects the silicate fabric and hence gives information about magma flow, emplacement related strain and/or tectonic strain. However, a detailed analysis of this link between macroscopic magmatic fabric and AMS fabric is still lacking.

We present the first comparison between different fabric datasets to show how the macroscopic silicate fabric is linked to the magnetite-controlled AMS fabric on the grain-size scale. Datasets include 1) macroscopic silicate fabric measured directly in the field; 2) macroscopic silicate fabric derived from image analysis of rock slab pictures and sample pictures [1]; 3) shape preferred orientation (SPO) of mafic silicates from X-ray tomography images; 4) SPO of magnetite grains from X-ray tomography images [2]; 5) calculated distribution of magnetite grains from X-ray tomography images; 6) AMS fabric. The data were collected in the granitic intrusion of the Lago della Vacca Complex, Adamello Batholith, Italy.

Macroscopic mineral fabrics measured in the field and obtained with image analysis agree with each other and with the SPO of mafic silicates calculated from the tomography scans. Furthermore, the tomography results show that the SPO of mafic silicates and of the magnetite grains are consistent with the AMS data whereas the distribution of the magnetites is less compatible with the AMS fabric.

The consistent results obtained from a variety of methods demonstrate that the orientation of the AMS ellipsoid coincides with the macroscopic silicate fabric. This enforces the application of AMS as a robust tool to characterise magmatic fabrics in granitic intrusions.

[1] Launeau *et al*. (2010) *Tectonophysics* **492**, 230-239. [2] Ketcham (2005) *J Struct Geol* **27**, 1217-1228.

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