**Redox front effect on the adsorption of cesium and strontium on pumice tuff**

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The part of host rock of a waste repository could always be vulnerable to weathering slowly by contacting the surface/subsurface water and weathered zone or redox front can be formed. This long term weathering processes in the geosphere surrounding the repository might have significant effect on the adsorption of certain nuclides that could be released from the radioactive wastes. Since this phenomenon is quite frequent in subsurface, adsorption characteristics of two strategically very important nuclides from radioactive waste, cesium and strontium were investigated on fresh, unweathered rock and on weathered or oxidized part, collected from redox front zone of pumice tuff, which is already been selected for hosting low and intermediate radioactive wastes in Japan. Batch sorption study was carried out to explore the difference of adsorption mechanism at wide range of pH 4-12, varying nuclide concentration from $10^{-4}$ to $10^{-7}$ M and different ionic strength of 1.0, 3.0. Powder of 150-300 µm size and approximately 1 $cm^3$ blocks of pumice tuff were used as two phases of rock. Pore size distribution and specific surface area of the fresh and weathered pumice tuff were determined as supporting analysis. Mineralogical composition was done by XRD and optical microscopy; and elemental analysis by SEM-EDX. Solution chemistry was determined by ICP-MS and finally data were simulated with IgorPro 6.2. Since a slight weathering of a fresh mineral surface leads to the formation of available exchange sites and an increased sorption, higher distribution coefficient values were found in the weathered part than fresh pumice tuff. The distribution coefficient difference between block and powdered rock is expected to be caused by the effect of diffuse electric double layer, long equilibrium period and the physical property of fracture during experiment.

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**Retracing signals of historical soil erosion in peatbog archives as an indicator for landscape resilience in the context of future landuse changes and weather fluctuations (TUM-CZO, Ammer Mts.)**

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As an example for recent research attempts within the Critical Zone Observatory of the Technical University of Munich (TUM-CZO), located in the Ammer Mountains of the Bavarian Alps, we present a project which deals with the investigation of possible soil loss triggers and dynamics in alpine landscapes. As soils represent the central part of the heterogeneous interaction system of the Critical Zone, they hold an essential relevance for a broad variety of up-to-date questions concerning the long-term sustainability of numerous natural resources and ecosystem services. Soil loss consequently causes serious, irreversible loss of vital soil functions and thus ecosystem services. Hence, determining risks of soil degradation and soil loss is a major task within the Critical Zone research.

The reconstruction and analysis of past erosion incidents is an essential key to understanding the driving factors of soil erosion or landscape resilience as reaction to external triggers (both natural and human). Peat bogs containing interlayered strata of mineral colluvial fillings are ideal archives for such reconstructions. Within the Ammer catchment, we investigate a total of twelve peat bogs distributed across an altitude gradient from alpine to subalpine and lowland landscapes. In addition to the extraction of conventional drilling cores, Ground Penetrating Radar is used as a non-invasive method of highlighting the internal stratification of the peat bogs. Various dating techniques can be applied to both organic and mineral layers ($^{14}C$, OSL, pollen analysis). Pollen analysis adds additional proxy data on vegetation and climate. The results then allow the correlation with well known, prominent climatical stages (e.g. Little Ice Age) and extreme weather incidents in the past as well as with historical records on land use. By this, valuable insight on characteristic regional landscape dynamics and thresholds is provided.