Patterns and processes of long-term drainage exports from a pine chronosequence on restored lignite-mining dumps in Lusatia, Germany

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Opencast lignite mining results in severe multiple disturbances of ecosystem functions. In the Lusatian lignite mining district (E-Germany), an area of 80.000 ha is characterized by overburden dumps, tailings and mining lakes due to intensive lignite mining. Pyrite oxidation and AMD result in initially phytotoxic site conditions. On 60% of this area pine forests have been restored after intensive amelioration measures.

Characteristic features of the soils developing at these sites are sandy texture, poor water and nutrient storage capacity, high acidity and salinity, secondary mineral formation, and a high content of geogenic organic matter in various forms and spatial distribution (Schaaf and Hüttl 2006). We studied the relevant soil structures and processes along a chronosequence of mine sites as well as the effects of its specific properties on element budgets and drainage exports at various scales using intensive field measurements, small-scale monolith sampling, and soil column experiments.

Pyrite oxidation itself and labile secondary minerals as well as the content and distribution of geogenic organic matter and its related physico-chemical properties affects water and element transport, element transformation and release processes, nutrient cycling, and soil development. The disturbance effect on element exports is declining over time, but can be clearly identified over a period of at least 60 years with considerably increased leaching rates from the restored ecosystems (Schaaf 2001).

References

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Numerical study on shock effects in impact-rocks due to porosity

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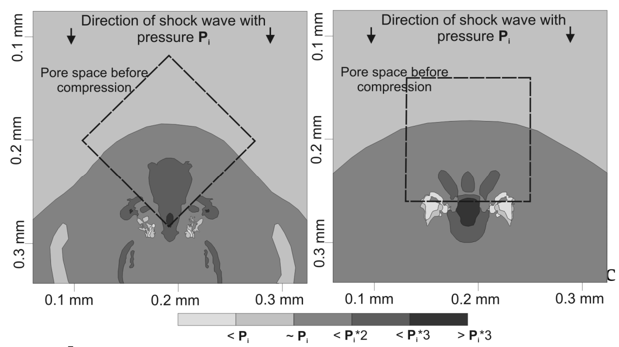
Motivation and method

The heterogeneous distribution of crystalline shock polymorphs is commonly observed in impact rocks, and results from impedance contrasts between different minerals (e.g. Heider and Kenkmann, 2003) and pore spaces (e.g. Kieffer, 1976, Steward, 2007). We present numerical simulations of pore collapse due to shock wave loading to analyse the dependency of pre-shock internal rock structure on the resulting variety of shock features. We use the 2D hydrocode iSALE (e.g. Wünnemann *et al*., 2006) and the analytic EOS (ANEOS) for dunite and quartzite. Pore spaces are represented by simple geometries, aligned by varying their sizes, distances and numbers.



Results

Significantly enhanced high temperatures and pressures occur when the collapse of a pore is completed. The maximum and distribution of peak pressures dependents on the geometry (Fig. 1), number and alignment of pores.

Results will be furthermore compared analytically with impacted terrestrial and meteoritic rocks.

References

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