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The Genesis of tectonically and hydrothermally controlled industry mineral deposits: A geochemical and structural study

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The study aims to investigate the role of hydrothermal fluids in the formation of talc and magnesite deposits. These deposits occur in manifold geological and tectonical settings such as stockworks and veins within ultramafite hostrocks and monomineralic lenses within marine platform sediments. Along shear zones talc mineralizations may occur as a result of tectonical and hydrothermal activity. To understand the role of the fluids for the genesis of the mineralization, deposits in different geological and tectonical settings are investigated:

Talc mineralization within in magnesite in low-grade palaeozoic nappe complexes (Gemerska Poloma, Slovakia):
The magnesite body lies within the Gemer unit of the Inner Carpathians consisting of Middle Triassic metacarbonates and Upper Triassic pelagic limestones and radiolarites. The talc mineralization is bound to crosscutting veins. Two metamorphic events can be distinguished, one during Variscan orogeny and one related to the Alpine orogeny leading to the formation of talc along faults in an Mg carbonate body (Radvanec et al, 2004).The origin of the fluids as well as the tectonic events leading to the mineralization is still widely unknown.
Talc mineralization in shearzones within Palaeozoic meta sedimentary rocks (Sa Matta, Sardinia):
Variscan granitoids intruded Palaeozoic meta sedimentary rocks and were overprinted be NE striking tectonic structures that host talc mineralizations. The origin of Mg and fluids leading to the mineralization is still not answered satisfactorily (Grillo and Prochaska, 2007) and thus a tectonic model for the genesis of the talc deposit is missing.
Talc mineralization within UHP pre-Alpine continental crust (Val Chisone, Italy):
The talc deposit forms part of the Dora-Maira Massif. Geologicaly the massif derived from a Variscan basement that includes post-Variscan intrusions. The talc mineralization occurs as a sheetlike, conformable body. A possible tectonic emplacement of talc along shear surfaces was proposed by Sandrone & Zucchetti, 1988.
Magnesite and talc bearing shearzones in ultramafic hostrocks (Lahnaslampi & Horsmanaho, Finland):
Both deposits are situated in the Proterozoic schist belt where the talc-magnesite rocks at Lahnaslampi are associated with minor serpentine breccias. The steatitization took place in two different stages: During prograde metamorphism with H2O-dominated solutions and at declining temperature and pressure in the presence of CO2-bearing fluids that resulted in the main steatitization along tectonic structures.

A combined geological, petrological and geochronological is chosen to resolve mechanism of mineralisation within the different tectonic setting. Different phases of mineral formation are first distinguished by pertrological and structural field work and then dated by radiometric techniques. Fluid species and chemical environment during mineralisation is resolved by geochemical techniques and stable isotope studies.

References

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