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Vein mineralizations - record of paleo-fluid systems in the Thuringian basin (Germany)

Petra Lepetit, Lothar Viereck, Michael Abratis, and Stefanie Fritsch
Institut für Geowissenschaften, Friedrich-Schiller-Universität Jena, Germany (Petra.Lepetit@uni-jena.de)

Vein-related mineralizations within the Mesozoic sediments of the Thuringian basin (Germany) are investigated in analytical detail (petrography, XRD, XRF, EPMA, LA-ICP-MS, and isotope studies: O, C, S, Sr) in order to characterize paleo-fluid systems that intruded the basin and circulated within it millions of years ago. Samples from 55 outcrops, 34 quarries and 21 drill cores comprise mainly carbonates (calcite, dolomite, siderite, ankerite), additional sulfates (gypsum, celestine, barite,), and rarely sulfides. The mineralizations are almost exclusively restricted to WNW-ESE trending fault systems.

First δ^{13}C and δ^{18}O isotope analyses of calcite mineralizations reveal differences between veins within Triassic sediments (Lower Muschelkalk: δ^{13}C: 1.8 to 2.9 ‰, mean 2.3 ‰, δ^{18}O: -7.3 to -10.4 ‰, mean -8.2 ‰) and Jurassic sediments (δ^{13}C: -0.7 to -2.1 ‰, mean -1.4 ‰, δ^{18}O: -9.3 to -10.6 ‰, mean -9.9 ‰), indicating intra-formational and extra-formational paleo-fluid transport.

Also first δ^{34}S and δ^{18}O isotope analyses of gypsum mineralizations display differences between veins within Triassic and Permian sediments, respectively. These initial data are comparable with isotope analyses of vein-related host rocks and hydrochemical signatures of recent well waters in the Thuringian basin indicating intra-formational in addition to extra-formational paleo-fluid transport.

Further isotope studies are in progress including high resolution in situ-Sr- isotope analysis. The present study is part of INFLUINS, a BMBF-funded project bundle, which is dedicated to the comprehensive description and understanding of the fluid systems within the Thuringian basin in time and space.