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

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We investigate vein mineralizations within and around the Thuringian basin (Germany) in order to characterize paleo-fluid systems that have been active in the basin. By investigating the composition, temperature, origin, age and evolution of paleo-fluids in the Thuringian basin as a model case, we aim for comprehensive understanding of the character of mineralized fluid systems in sedimentary basins in general and their evolution over geological time scales. Mineralizations along faults are archives for the composition of fluids which intruded the basin and circulated within it millions of years ago. These mineralizations give information on the physical and chemical characteristics of the related fluids as well as on their evolution with time during basin evolution. Mapping of mineralizations in space and time and comparison with the present-day fluid circulation system allows for recognition of the paleo-fluid dynamics and high temperature fluid influx pathways. The chemical characteristics of vein-related mineralizations are proxies for the paleo-fluid sources and their solution load.
Methods implied comprise bulk rock analyses (petrography, XRD, XRF, ICP-MS), mineral analyses (EPMA, LA-ICP-MS), fluid inclusion measurements (microthermometry, Raman spectroscopy, ion chromatography) and isotope studies (O, H, C, S, Sr).
Vein-related mineralizations within the Mesozoic sediments of the basin occur predominantly along WNW-ESE trending fault systems and comprise mainly carbonates and sulfates. Mineralizations within the basin-confining uplifted Variscan basement rocks and lowermost sedimentary units (Zechstein) show also (Fe-, Cu-, Zn-, As-, Sb-) sulfides, (Fe-, Mn-) oxides, fluorite and barite.
The present study is part of INFLUINS, a BMBF-funded project bundle which is dedicated to comprehensive description and understanding of the fluid systems within the Thuringian basin in time and space.