Geophysical Research Abstracts
Vol. 20, EGU2018-13788-2, 2018
EGU General Assembly 2018

Fault kinematics in the Thuringian Basin and the Flechtingen-Calvörde Block, Germany – The role of Jurassic extension tectonics in regional deformation patterns

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Fault systems in the Thuringian Basin and the Flechtingen-Calvörde Block of the central German platform show similarities in terms of fault orientation and kinematic mechanisms, that are mostly the result of thrust faulting during Late Cretaceous-Early Cenozoic inversion. Though fault and fracture patterns and their corresponding structural evolution during inversion have been subject to several scientific investigations, little is known with regard to the role of extension dynamics during Jurassic rifting. Recent studies on fracture populations and related vein mineralization in the Flechtingen-Calvörde Block revealed a set of WNW-ESE trending normal faults, (U-Th)/He dating of associated hematite mineralization proved formation during Late Jurassic times. As dating of fault systems strongly depends on the presence of mineralization suitable for radiometric age determination and, consequently, the age of some fault systems commonly remain unclear, we compare supra-regional fault patterns in order to demonstrate their similar tectonic evolution during the Mesozoic. In this study, we present a comprehensive approach to identifying analogue deformation structures and related fault kinematics in both study areas. Outcrops in sedimentary strata in the Thuringian Basin and in igneous rocks of the Flechtingen-Calvörde Block have been studied for comparison in terms of fault orientation, fracture populations and respective kinematic mechanisms. In addition, mineralized fractures in reoriented drill core samples from the adjacent Altmark Basin were used for comparison with a special focus on absolute ages. We aim to reconstruct post-Triassic regional stress states in both areas. Finally, we compare our results with previous findings in order to present a comprehensive model of regional brittle deformation in Central Europe with special focus on pre-inversion tectonics and fault reactivation.