Geophysical Research Abstracts
Vol. 20, EGU2018-3636, 2018
EGU General Assembly 2018

What is the influence of pre-existing structures on regional intraplate tectonic stress fields? A case study of the central German platform

Payman Navabpour (1), Jonas Kley (2), and Madeline Richter (1)

(1) University of Jena, Institute of Geosciences, Jena, Germany, (2) University of Göttingen, Geoscience Center, Göttingen, Germany

The central German platform is an open laboratory for understanding the evolution of paleostress fields across a variety of reactivated pre-existing structures under different tectonic regimes, which change from subsidence in Jurassic to inversion in Late Cretaceous, and from rifting in Cenozoic to the present-day states of stress.

Here, we address the kinematic evolution of differently oriented pre-existing structural domains for an area where N120-striking faults of Thuringia interfere with N030-striking faults of Hesse. The data include fault striations collected mostly from the Triassic Muschelkalk limestone of the sedimentary cover. The data analysis and separation were carried out through stereographic projections based on field observations on relative tilt geometry between the fractures and strata, structural cross-cutting criteria and kinematic change indicators on the fault slickensides. The separated data were next categorized into large datasets of chronologically consistent kinematics across each structural domain and used for stress tensor inversion.

According to the fracture patterns, normal and reverse faults are dominant features along the N120-striking structures, whereas most fractures along the N030-striking structures indicate normal and strike-slip kinematics. Oblique fault reactivations provide further constraints on the change in orientation of stress fields across the pre-existing structures. For the N120-striking structures, the fault kinematics suggest a succession of sub-horizontal principal stress axes orientated N035 σ_3, N010 σ_1 and N030 σ_1, changing from normal faulting to oblique thrust and reverse, respectively. For the N030-striking structures the succession is N065 σ_1, N115 σ_3 and N140 σ_1, changing from oblique thrust to normal and strike-slip faulting, respectively.

A comparison of the fracture patterns and paleostress fields within the overall tectonic regimes reveals consistencies and differences between the structural domains that include promotion or obliteration of certain fracture kinematics and reorientation of specific stress axes across differently oriented pre-existing structures. The results provide insights into reconstruction of intraplate paleostress trajectories.