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

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1. Geological setting

2. Kinematic change indicators

3. Succession of stress fields

4. Regional tectonic setting

The study area is located in the central German platform and highlights two prominent structures: the N030-striking Lichtenau Graben and the N120-striking Eichenberg-Gotha-Saalfeld Fault Zone.

The age of affected rocks indicates that the succession of fault reactivation belongs to post mid-Triassic events. According to the fracture patterns, normal and sinistral strike-slip faults are dominant features along the N030-striking Lichtenau Graben, whereas most fractures along the N120-striking Eichenberg-Gotha-Saalfeld Fault Zone indicate normal and reverse motion. The successive strie on the fault slickensides provide evidence for relative binary chronologies of fault reactivations.

Based on the binary chronologies observed on fault slickensides, a succession of sub-horizontal principal stress axes orientated N065 1, N115 2, and N140 3 changing from oblique thrust to normal and strike-slip faulting, respectively. For the N120-striking Eichenberg-Gotha-Saalfeld Fault, the succession is N035 1, N010 2, and N030 3 changing from normal to oblique thrust and reverse faulting, respectively. A synthesis of data within the regional tectonic setting reveals consistencies and differences between the structural domains. Within this tectonic setting, the normal and reverse reactivation of NW-SE-striking faults could be attributed to the Jurassic extension and the Late Cretaceous inversion, respectively. The normal and sinistral fault reactivation along the NE-SW-striking faults could be consistent with a change in stress regime from the Cenozoic rifting to the present-day NW-SE-trending maximum horizontal shortening.