Geophysical Research Abstracts
Vol. 19, EGU2017-4170, 2017
EGU General Assembly 2017

Does intraplate brittle deformation indicate far-field stress signals? A case study of Central Europe

Payman Navabpour (1), Jonas Kley (2), Eline Le Breton (3), Douwe J.J. van Hinsbergen (4), and Kamil Ustaszewski (1)

(1) University of Jena, Institute of Geosciences, Jena, Germany, (2) University of Göttingen, Geoscience Center, Göttingen, Germany, (3) Free University of Berlin, Department of Earth Sciences, Berlin, Germany, (4) Utrecht University, Department of Earth Sciences, Utrecht, The Netherlands

Even though Central Europe has been located within a plate interior since the end of the Variscan orogeny, its intracontinental basins and highs recorded a succession of different tectonic regimes throughout the Mesozoic and Cenozoic, which were coeval with events at distant plate margins. A long Triassic–Cretaceous period of weak subsidence with intermittent extension was followed by NNE-SSW contraction in the Late Cretaceous–Paleocene. Renewed extension led to the formation of the Cenozoic Rift System and eventually evolved to the present-day variable stress regimes with a consistent NW-SE-oriented maximum horizontal shortening, S_{Hmax}. The detailed knowledge of this evolution relies on exhaustive lithostratigraphy and geochronological datasets, as well as on reconstruction of successive states of paleostress that controlled the formation and/or inversion of intracontinental basins. In combination, these data provide an excellent opportunity of linking the intracontinental deformation to the lithospheric plate boundary kinematics.

Regional-scale analysis of fault kinematics in Central Europe unveiled a succession of consistent stress states for the crystalline basement and sedimentary cover of the brittle crust. These states of stress include a post-Triassic normal faulting regime with NE-SW-trending σ_3 axis, strike-slip and thrust faulting regimes with NNE-SSW-trending σ_1 axis, supposedly of Late Cretaceous age, and two younger events of normal and strike-slip faulting regimes with NW-SE-trending σ_3 and σ_1 axes, respectively. In this study, we report on the first attempts of linking the central European intraplate kinematics to changes in relative motion between the plates. The integration of stress fields with plate boundary kinematics suggests that the Late Cretaceous contraction may be explained by a change in African plate motion with respect to Eurasia from SE-directed sinistral transform to NNE-directed convergence. The reorientation of contraction to the present-day S_{Hmax} likely results from a change in direction of Africa–Eurasia plate convergence from N-S to NW-SE combined with plume-enhanced ridge push of the North Atlantic Ocean.