Geophysical Research Abstracts
Vol. 16, EGU2014-12717-1, 2014
EGU General Assembly 2014

Analysis of a conjugate normal fault system caused by subsidence and bulge development within the alpine foreland basin in Bavaria

Hartwig von Hartmann, Sandra Schumacher, and David C. Tanner
LIAG, Hannover, Germany (hartwig.von-hartmann@liag-hannover.de)

The Upper Jurassic carbonate platform of the Bavarian Molasse Basin is one of the main targets for the exploration of hydrogeothermal reservoirs in Germany. A 120 sq km large seismic survey was interpreted to map the fault system that is fundamental for the characterization and evaluation of the reservoir. The carbonate platform shows a complex pattern of faults that strike southwest – northeast and west – east, the latter approximately parallel to the Alps front. Faults within the Tertiary infill are more sparsely distributed and form a series of conjugate normal faults with alternating polarity that run across the whole survey. Within the western part of this fault system the main basement fault and the conjugate faults meet near the top of the carbonate platform, thus forming rotated blocks above the crossing. The analysis of fault juxtapostion diagrams show that throw diminishes up- and downwards on the fault planes of the conjugate normal fault. The basal fault tips are offset by more than hundred meters from the corresponding faults within the carbonate platform.
Two tectonic phases can be distinguished: The breakup of the platform due to basement subsidence and the formation of the large conjugate normal faults afterwards. The latter maybe the result of intracontinental plate bending that formed a foreland bulge during the collision of the European and the African plate. Such bulge formation is also known i.e. from the collision of the Indian and the Asian plate. The fault pattern of the Upper Jurassic carbonate platform probably triggered the formation of later faults, but their geometry was caused by a different stress field and different rheologies of the Molasse Basin (compared to the carbonate platform). Consequently the fault members of both systems are offset to each other.
The interpretation shows a detailed insight into the formation of a fault system within a foreland molasse basin. The decoupling of the covering Molasse sediments and the basement means that basement structures were untouched during the further basin development and the healing of the basement faults may therefore have led to a critical decrease in fluid permeability. These observations are important for the conceptual role of faults within the framework of geothermal exploration.