Geophysical Research Abstracts
Vol. 12, EGU2010-2483-1, 2010
EGU General Assembly 2010

Miocene transpression is the cause for the uplift of the Vosges and Black Forest Mountains

Yair Rotstein (1,2) and Marc Schaming (1)

(1) Institut de Physique du Globe de Strasbourg (CNRS-UDS/EOST), Strasbourg, France (Yair.Rotstein@eost.u-strasbg.fr) +33-368-850093, (2) U.S.-Israel Binational Science Foundation, Jerusalem, Israel (yair@bsf.org.il)

It has long been demonstrated that the present Vosges and Black Forest Mountains, the uplifted margins of the Upper Rhine Graben, are the result of renewed uplift in the Miocene, and are not typical uplifted rift shoulders. Variety of mechanisms to explain these uplifts were suggested but none is widely accepted. In contrast, the Miocene development of the Heidelberg-Mannheim Basin, the other young feature in the Upper Rhine Graben, is now widely accepted to be the result of transtension. This transtension was caused by an Early Miocene change in the regional stress regime that changed the Upper Rhine Graben into a continental transform. The N15°W trend of the Heidelberg-Mannheim Basin in the new N-S directed sinistral strike-slip regime resulted in this transtension and extension. Similarly, the rest of the Upper Rhine Graben must have been under transpression in the Miocene stress regime, since the main boundary faults were trending N15°E to N30°E. This transpression resulted in the uplift of the present Vosges and Black Forest Mountains. Seismic reflection sections from the boundary of the graben with the Vosges Mountains show an apparent correlation of the structure with the trend of the boundary. South of Colmar, in the only N-S segment along this boundary, conventional listric normal faulting is observed. In contrast, in segments trending NNE-SSW or NE-SW, strong transpression is evidenced by sediments uplift of 1500m, and possibly more. Similar observations along the boundary of the graben with the Black Forest Mountains suggest also a large uplift of the boundary area there. Near Baden-Baden, where the Black Forest Mountains end, a deep and unaccounted for sedimentary basin extends northward along the boundary. It is filled mostly with Miocene-Pliocene sediments, indicating that it is also part of the same tectonic phase. Seismic data suggest that this linear basin is the result of Miocene buckling of the sediments, in a boundary segment that experienced a lesser amount of transpression. We speculate that the reduced transpression there is the result of the larger distance from the Alpine front. This is also suggested by the observation that each of the boundary uplifts is highest near its southern end, and it becomes gradually lower northward. Finally, we note that this tectonic framework can also explain the unusual observation of two large boundary faults along each of uplifted margins. The Vosges and Black Forest Faults exhibit the classical arc shape of boundary faults in continental rifts. However, such shape is mechanically unfavorable in a strike-slip regime, and led to development of the linear western and eastern Rhine Faults, on both sides of the graben, as the main active faults in the transform environment.