

STRUCTURE AND EVOLUTION OF A MAIN SEGMENT BOUNDARY ALONG THE EAST ANATOLIAN FAULT. EASTERN TURKEY.

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Abstract

The Lake Hazar occupies a 20 km long, 5 km wide and 216 m deep basin along the East Anatolian strike-slip Fault, which accommodates, together with the North Anatolian Fault, the westward extrusion of the Anatolian block. Located within 100 km of at least three significant dams on the Euphrates-Tigris river system, it is a major structure along the East Anatolian Fault and the locus of two historical earthquakes of magnitude 7.1 and 6.7 in 1874 and 1875 respectively. This poorly studied lake (only approximate bathymetric map) was the focus in summer 2007 of a multidisciplinary study in order to constrain its structure and sedimentation and propose a coherent scenario of the 1874-1875 earthquake sequence.

We present here a structural study of Hazar Basin constrained by single-channel high-resolution seismic data combined with land-based observations. The structure obtained shows a transtensional zone located in the northeastern part of the basin and a transpressional zone in the southwest of it, both bypassed by a continuous strike-slip fault that cuts across the lake in a single segment. According to the information from the

seismic profiles together with the fault map and the similarities with analog models, we conclude that the transtensional zone represents an evolved pull-apart basin. This basin presents a structural offset of 3.5 km, minimum sedimentary infill of 500 m and an age older than 400,000 yr. With regard to the transpressional zone, there is not enough data to unravel its origin and evolution as sound as the pull-apart; hence we present two models based on the fault geometry and onland observations respectively.

The combination of the resulting structural map from the lake with the structure onshore reveals that the continuous strike-slip fault segment found inside of the lake links the two master faults located in the northeast and southwestern side of the lake respectively. Consequently, we demonstrate that there is not a segment boundary at Lake Hazar; on the contrary, the East Anatolian Fault is continuous from Palu to Sincik over 130 km. Thus, we propose that the Palu-Sincik segment was the fault that ruptured in the magnitude 7.1 earthquake occurred in 1874, whereas the normal fault system bounding the southern side of the basin was the one responsible for the magnitude 6.7 earthquake of 1875.