



Quaternary Faulting Mechanisms around the Karlıova Triple Junction

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The major issue that we will address in this study is to interpret the Quaternary faulting mechanism of Karlıova Triple Junction (KTJ), which has been formed by intersection of the North Anatolian Fault Zone (NAFZ), the East Anatolian Fault Zone (EAFZ) and the Varto Fault Zone (VFZ) at 10 km northeast of Karlıova town of Bingöl. To this end, at first, geometric and morphotectonics characteristics of the main fault zones and secondary faults, which has been formed by interaction of three main fault zones, have been investigated by evaluating of satellite images such as; LAND-SAT, ASTER and SPOT, aerial photos and digital elevation models. Besides remote sensing studies, extensive field studies were performed over the aforementioned faults. Since whole region covered by Plio-Quaternary volcanic rocks, all secondary faults can be accepted as Quaternary faults. As a result of these studies we define the geologic and morphotectonic characteristics of Ilıpınar segment of the NAFZ, which has N65-70W orientation and has a length of 25 kilometers, north-easternmost part of the EAFZ - Göynük Segment-, which elongates with N55-70E orientation and has a length of 25 km and VFZ, which commences from KTJ and extend to north of Varto town of Bingöl about 35 km. 10 km wide VFZ is formed by nearly NW-SE trending three parallel fault branches from north to the south. These studies strongly proved that there are two different fault types between the NAFZ and EAFZ. The dominant fault type start as a strike-slip fault and when it turn to SE its sense of motion change to strike-slip fault with normal component. These faults are responsible to forming the special kind of caprock -cuesta-. The other secondary faults formed close to EAFZ and these are more or less parallel to the EAFZ. These sinistral faults have been defined by boundary between Holocene unit and Quaternary volcanic rocks around Karlıova Basin. All secondary faults between VFZ and EAFZ have a strike slip character. The faults which are stated NW-SE and nearly parallel to the VFZ are dextral, whereas sinistral faults are N-S extending and nearly orthogonal to NW-SE trending right lateral faults. Sinistral faults develop in the overlap area between adjacent left-stepping dextral faults which are arranged in an en echelon pattern. All in all, we put forward an analogy between Quaternary fault pattern around KTJ and three dimensional analogue models to explain geometry of fault and interpret the mechanisms of faulting around KTJ. The model constructed on the ground of two analogue models. West of the triple junction, characterized by Prandtl Cell Model (PCM) and east of the junction by 60 km wide shear zone that has been governed by VFZ and Murat Fault (MF) which is at south of VFZ and discovered during the this study. Geometrical relationship among the secondary faults in the region which are delimited by EAFZ, VFZ and MF support the 18 to 23 degree counterclockwise block rotation.