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Morphometric Analaysis of Secondary Faults Around Karlıova Triple Junction

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Quantified geomorphic features can be used to extract tectonic signals. Here we analyze the drainage patterns, long profiles and hypsometric integral of bedrock rivers that drain across and around secondary faults of Karlıova Triple Junction (KTJ) which has been formed by interaction of the North Anatolian Fault Zone (NAFZ), the East Anatolian Fault Zone (EAFZ) and the Varto Fault Zone (VFZ). Careful examinations of these rivers contribute to understanding of Quaternary faulting mechanism of KTJ. In this study we investigate three actively deforming provinces. Each province has different river system and bounded by strike-slip faults. Not only morphotectonic features but also deformation styles vary within each province. We analyze seventeen branches of Peri River. Nine of them positioned at north and eight of them positioned at south of the Peri river which are controlled by easternmost segment of NAFZ and the secondary faults between NAFZ and EAFZ respectively. Besides we analyze six branches of Göynük River. Totally fourteen river branches were analyzed to determine the activity of secondary faults between NAFZ and EAFZ. Secondary faults between NAFZ and EAFZ are characterized by two fault set. The first and the most prominent fault start as a strike-slip sense in motion and when it turn to SE its sense of motion change to oblique normal. The second set is poorly recognizable and their sense of motion is sinistral strike-slip. Constructed analogy of long profile and hypsometric integral between most eastern segment of NAFZ and secondary faults between NAFZ and EAFZ demonstrate that faults which are formed near the EAFZ are tectonically quiescent whereas the other faults formed close to NAFZ are tectonically active. Our analysis proved that rivers controlled by these latter faults are undergoing permanent response to continuous tectonic uplift, and this elucidation is strengthen by classic morphological indicators of strike-slip faults such as offset rivers and hills, pressure ridges. Furthermore, change in sense of motion create classic stratigraphic landform –cuesta- which is also indicator of fault activity. At west of KTJ four different river system were analyzed. The northern river controlled by Varto Segment of VFZ therefore its characteristics are strikely different from most eastern segment of NAFZ. The other three river systems controlled by secondary faults which are formed in 60 km wide shear zone. Since these faults accommodate only minor displacement, their effect observed on the drainage pattern rather than geomorphic indices. The drainage pattern in this province is a transition form between rectengular and dendritic drainage systems. All in all, we concluded taht secondary faults around KTJ are highly active and distribute the strain over a large area. Defining activity of secondary faults facilitate to interpret Quaternary faulting mechanism of KTJ that characterized by Prandtl Cell Model (PCM) at west and by 60 km wide shear zone at east.