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The Geological, Geomorphological Features and Kinematic Analysis of Active Faults Controlling Kemalpaşa Basin, Southwestern Part of Gediz Graben, Western Anatolia

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The purpose of this study is to discuss the geological and geomorphological features of active faults controlling Kemalpaşa Basin. The study consists of basin-bounding faults expressions, kinematic and geomorphic analysis.
Kemalpaşa Basin, which is approximately ENE trending and asymmetric graben is located in the southern part of Gediz Graben. Menderes Massif and Bornova Complex comprise the basement rocks of basin. Kızılca Formation, Sütçüler Formation and Alluvium uncomformably overlie the basement rocks. Kemalpaşa Basin which is one of the Quaternary basin in the Western Anatolia Extensional Province was developed at the structural border of the Spildağı Fault Zone in the north and the Kemalpaşa Fault in the south. Both the north and south margin-bounding faults of Kemalpaşa Basin are oblique-slip normal faults. According to the results of kinematic analysis, Kemalpaşa Basin has been formed under a NE-GW trending extensional tectonic regime.
The variation in the relative degree of tectonic activity in Kemalpaşa Basin and its surroundings were interpreted a detailed geomorphic study of the fault-generated mountain fronts and drainage pattern of the both sides. To identify the impacts of active faults controlling the north and south margins of Kemalpaşa Basin on the geomorphological evolution, the geomorphic indices such as drainage basin geometries, triangular facets, axial river profiles have been determined and the degree of tectonic activity in the both sides of Kemalpaşa Basin has been numerically defined using morphometric indexes such as asymmetry factor (AF), hypsometric curve and integral (HI), valley floor width-to-height ratio (Vf) and mountain front sinuosity (Smf). In morphometric analysis, the both sides of the basin were investigated separating into two segments as the west and east. The values of HI (0,28-0,60), Vf (0,27-0,60) and Smf (1,3) calculated for the western part of the north margin compared with the values of HI (0,16-0,46), Vf (0,64-1,11) and Smf (1,5) calculated for the eastern part, it is indicated that the relative degree of tectonic activity of western part is higher than the eastern part in north side of basin. Similary, the values of HI (0,06-0,44), Vf (0,35-0,92) and Smf (1,2) calculated for the western part of the south side compared with the values of HI (0,45-0,57), Vf (0,04-0,1) and Smf (1,11) calculated for the eastern part, it is indicated that the relative degree of tectonic activity of eastern part of the south side is higher than the western part in south side of basin. As well as the analyzed normal faults controlling the morphology of the both side of Kemalpaşa Basin are highly active, the results obtained from morphometric analysis suggest that the impact of tectonic activity on geomorphological evolution and the uplift in the south side of Kemalpaşa Basin is higher as compared to the north side.
Keywords: Kemalpaşa Basin, active tectonic, tectonic geomorphology, morphometric analysis