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Structural and petrographic analysis of hypabyssal rocks in the central Menderes Massif: implications for the role of transfer zones during detachment faulting

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The central Menderes Massif is formed by complex assemblages of transfer zones, detachment faults and associated syn-extensional granitoids in western Turkey. Syn-extensional Salihli and Turgutlu granitoids were widely recognized in the footwall rocks of the Gediz detachment fault, but their hypabyssal equivalents were not described in detail. Hypabyssal rocks discovered during this study include substantial structural data that may shed light into the development of transfer zones during detachment faulting. Hypabyssal rocks are mafic and felsic in compositions. Mafic rocks, which are located to the SW of the Turgutlu granitoid, were emplaced into the phyllites as sills and dykes that were surrounded by a narrow hornfelsic halo. Dykes are subvertical and trend N20oW, intersecting the phyllites of the Menderes Massif. They include abundant xenoliths of phyllite and gneiss and are mainly characterized by ophitic texture formed by plagioclase, tremolite/actinolite, biotite, and pyroxene crystals. Felsic dykes, which are located in the SE of the Salihli granitoid, are defined as three subparallel, N10oW-trending dykes that intrude into the mica schists. Felsic dykes consist of quartz, sanidine and plagioclase and zircon, apatite and allanite as accessory phases. They display holocrystalline hypidiomorphic porphyritic texture, suggesting their typical shallow-seated and hypabyssal emplacement. Microcrystalline matrix surrounds embayed quartz and locally corroded crystals. Alteration mineral assemblages of chlorite, epidote and sericite and carbonatization are also common. Their mineral constituents appear to be similar to those of the Salihli granitoid. Felsic dykes have well-preserved two sets of slip surfaces striking NE and NW in directions. These sets have both normal and strike-slip components. Kinematic analysis of slip sets designate a ∼NNE-SSW extensional direction, which is consistent with regional principal stress axes. It can be further speculated that the felsic dyke cluster was emplaced into an extensional gauge formed by a relatively large-scale NE-trending shear zone along the footwall rocks of the Gediz detachment fault.

Keywords: Central Menderes Massif, transfer zone, hypabyssal rocks, kinematic analysis.