



Deformation history of the Marmara Granitoid and implications for a dextral shear zone in NW Anatolia

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Marmara granitoid (47 Ma) is a representative example of the Eocene post-collisional magmatism which produced several granitic plutons in NW Anatolia, Turkey. It is a W-E trending sill-like magmatic body which was concordantly emplaced into the metamorphic basement rocks of Erdek Complex and Saraylar Marble. The granitoid is represented by deformed granodiorite which displays well-developed lineation and foliation in meso-scale defined by the elongation of mica and feldspar crystals and recrystallization of quartz however, in some places, magmatic textures are preserved. Deformed granodiorite is broadly cut by aplitic and pegmatitic dikes and contains mafic enclaves which display the same deformation indicators with the main granitoid.

Microstructural analysis shows that the solid-state deformation of the Marmara granitoid is classified as ductile deformation with high temperatures and ductile-to-brittle deformation with relatively lower temperatures. Evidence for the ductile deformation of the granitoid is represented by chessboard extinction of quartz, grain boundary migration (GBM) and subgrain rotation recrystallisation (SGR) which exhibits that the deformation temperature changed from 600 °C to 400°C. Bulging recrystallization (BLG), grain size reduction of amphibole, biotite and plagioclases and microcracks on plagioclases were considered as overlying ductile-to-brittle deformation signatures which develop between 300-250 °C temperatures.

All of these field and micro-structural data collectively suggest that the shear sense indicators such as micafish structures and δ type mantled porphyroclasts displayed stair-steppings pointing out to a right lateral movement, indicating that the structural evolution and deformation history of Marmara granitoid was controlled by a dextral shear zone.