Geophysical Research Abstracts
Vol. 19, EGU2017-13049, 2017
EGU General Assembly 2017

An integrated study on microtectonics, geothermometry and thermochronology of the Çataldağ Core Complex (NW Turkey): Implications for cooling, deformation and uplift history

Omer Kamaci and Safak Altunkaynak
Istanbul Technical University, Geological Engineering, Istanbul, Turkey (kamaciom@itu.edu.tr)

We present an integrated study on structure, microstructure, geothermometry and thermochronology of the Çataldağ Core Complex (ÇCC) in NW Turkey in order to understand the cooling, deformation and uplift mechanisms. ÇCC is formed from an Eo-Oligocene granite-gneiss-migmatite complex (GGMC) and an Early Miocene I-type granodioritic body (ÇG: Çataldağ granodiorite) which were exhumed as a dome-shaped core complex in the footwall of a ring-shaped low-angle detachment zone (The Çataldağ Detachment Fault Zone; ÇDFZ) in the Early Miocene. New U-Pb zircon (LA-ICPMS) and monazite ages of GGMC yielded magmatic ages of 33.8 and 30.1 Ma (Latest Eocene-Early Oligocene). 40Ar/39Ar muscovite, biotite and K-feldspar from the GGMC yielded the deformation age span 21.38±0,05 Ma and 20.81±0.04 Ma, which is also the emplacement age (20.84±0.13 Ma and 21.6±0.04 Ma) of ÇG.
ÇDFZ is responsible for mainly top-to-the-north sense kinematic processes. The microstructural features of quartz, feldspar and mica indicate that the ÇCC has undergone continuous deformations during its cooling, from submagmatic to cataclastic conditions. Five microstructural grades have been classified under ductile (DZ) and ductile-to-brittle shear zone (SZ), according to the estimated deformation temperature and intensity of the strain. Microcline twinning, marginally replacement myrmekite and flame-perthite are predominant features for feldspar while chessboard extinction, grain boundary migration and subgrain rotation recrystallization is common for quartz in the DZ which has a deformation temperature range of >600°C to 400°C. Grain size reduction is an important factor for the ductile to brittle shear zone (SZ). Feldspar is represented by bulging recrystallization (BLG), feldspar-fish and domino-type microfracture/microfaulting and quartz show more elongated structures such as ribbons with high aspect ratios. Mineral-fish (muscovite, biotite and feldspar) structures indicate a temperature range of 500°C to <250°C. The GGMC and ÇG, which were formed in different periods, suffered continuous ductile-to-brittle deformation and uplifted together along ÇDFZ during Early Miocene when the first major period of N-S extension began in the western Anatolia. Microstructural grades, two-feldspar geothermometry and geochronological data indicate that the GGMC and ÇG, which were formed in different periods, suffered continuous ductile-to-brittle deformation and uplifted together along ÇDFZ during Early Miocene when the first major period of N-S extension began in the western Anatolia.