Geophysical Research Abstracts
Vol. 14, EGU2012-10135, 2012
EGU General Assembly 2012

Radiometric age determinations and their interpretations phenomena in the Menderes Massif (western Anatolia-Turkey)

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Radiometric isotope applications in geosciences have been enormously improving during the last decade. Most of these applications were also performed in the entire Turkey by various researchers. From southern to northern part of the Menderes Massif (western Anatolia), 40Ar-39Ar mica; Rb-Sr whole rock, mica; K-Ar whole rock, mica; U-Pb zircon isotope dilution; 207Pb-206Pb single zircon evaporation; apatite, zircon fission tracks, and Th-Pb monazite techniques are commonly applied methods.

Most of the age determinations and their interpretations in the Menderes Massif were or are still used to evidence the geodynamic nature of the region with its bordered paleogeography. Last 20 years, nearly, most of the age data in the massif conflict with the well-known stratigraphical and lithological features and still preserve its debate. Moreover, individual age techniques were not properly interpreted or performed within their parameters (closure temperatures, related mineral equilibrium, metamorphic conditions...etc.). Particularly, most popular age determination methods of 40Ar/39Ar mistakenly interpreted as cooling ages instead of neo-crystallization ages. Similarly, Rb-Sr mica ages could easily demonstrate open chemical behavior related to the fluid interactions and present the timing of last fluid circulation events instead of cooling ages. The age data obtained from massif were interpreted without any consideration of the widespread Oligo-Miocene magmatic activity in the northern Menderes Massif, Neogene volcanism, and graben structures in western Anatolia.

This study aims to present and summarize new (U-Pb-ID, 207Pb-206Pb single zircon evaporation, Rb-Sr mica) and previously obtained age data from northern and southern Menderes Massif in comparison with literature to better understanding of the age interpretations within their geological limits and related mineral features. Our results in comparison with previously published age data in their detailed stratigraphical features indicate that obtained youngest ages (c.20-25 Ma), which were previously interpreted as the cooling of the massif, are still questionable, and they are more likely representing the timing of fluid circulation events and/or resetting of their related isotopic systems.