



Kinematics of Izmir-Balikesir-Transfer Zone and the west Anatolian rotational history during the exhumation of the Menderes metamorphic core complex

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The İzmir-Balıkesir Transfer Zone (İBTZ) accommodates differential deformation between the Cycladic and Menderes metamorphic core complexes within the Aegean Extensional System and played an important role on the exhumation history of both complexes. Here, we determined the vertical axis rotational history of the İBTZ using paleomagnetic and geochronological data collected from Miocene volcanic and sedimentary rocks in 89 locations. The results indicate that rotations took place in two distinct time intervals and have a very distinctive pattern within and outside the İBTZ. The earliest phase of rotations took place during the early–middle Miocene interval and comprises volcanic, sedimentary, and syn-exhumation granitic rocks related to the detachment faults of the Menderes metamorphic core complex. The rotations within the İBTZ for this phase are consistently clockwise with a mean rotation of approximately 30 degree whereas the surrounding blocks, both in the west and the east of the İBTZ rotated some 25 degree counter-clockwise. Likewise, the rotation senses and amounts from the second phase are also consistent, but now in an opposite sense with respect to first phase.

These results indicate that the İBTZ is one of the major structures that developed during the early Miocene and accommodated west Anatolian and Aegean extension. The kinematics and rotational deformation of İBTZ seem to be changed by the end of the middle Miocene. The focal mechanism solutions of recent seismic events corroborate that the İBTZ is a presently active structure that accommodates and transfers west Anatolian extensional strain into the south Aegean Sea. This research is supported by Tubitak National Science Foundation Grant Number 109Y044.