A Paleomagnetic Study of the Tectonic Deformation in Circum-Marmara Region, NW Anatolia, during the Late Cretaceous and Cenozoic Period

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The Marmara region is located on the Alpine Himalayan orogenic belt which experienced an active tectonic deformation. The region consists of tectonic units such as the Istanbul Zone, the Strandja Zone, the Sakarya Continent. It is reported in the previous geological studies that the Istanbul Zone began to move southwards apart from the Moesia Platform with the effect of West Blacksea Fault in the west and West Crimea Fault in the east after the opening of the Black Sea in the Cretaceous. It is known that the Intra Pontide suture is formed after the closure of the Intra-Pontide ocean during the Early Eocene due to the collision between Istanbul Zone and the Sakarya continent which moved northwards. As a result of the continental collision, the region has completed its evolution under the influence of basin formation and the emplacement of North Anatolian Fault Zone from Miocene to the present.

In this study, Upper Cretaceous-Oligocene sedimentary and volcanic rocks were sampled at 103 sites to investigate the tectonic deformation of the area. As a result of rock magnetism studies, it was shown that magnetic minerals in sedimentary and volcanic rocks are defined by titanium-rich titanomagnetite showing low coercivity, while in limestone samples, magnetization is defined by hematite showing high coercivity. As a result of anisotropy of magnetic susceptibility (AMS) measurements, it was observed that most of the samples show magnetic foliation and a deformation ellipsoid which is oblate. Paleomagnetic results show counterclockwise rotation of 19.9°±10.9° for the Sakarya continent, 27.4°±11.6° for the Pontides and 15.6°±11.8° for the Strandja Zone from Eocene to present. The results indicate that the region has completed the collision in Eocene and rotated counterclockwise as a large block. Deformation due to basin development or fault bounded block rotations which developed after Miocene could not be detected in this study. Miocene paleomagnetic data from previous studies in the study area are compatible with counterclockwise rotations in Upper Cretaceous-Oligocene which shows that different blocks emplaced in the study area moved together as a single plate during Eocene-Miocene time.

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