Deformation of the Median Tectonic Line inferred from paleomagnetism

Hiroyuki Hoshi[1]; Kenta Tsutsumida[2]

[1] Dept Earth Sci., Aichi Univ. Educ.; [2] Dept. Earth Sci., Aichi Univ. Education

http://www.earth.aichi-edu.ac.jp/~hoshi/

The Median Tectonic Line (MTL) is the most prominent fault in Japan, traceable from Kanto region in the east to Kyushu Island in the west. It displays a generalized strike of ENE, but has a convex-northward shape to form a bending structure in central Honshu (Kanto-Chubu region). To clarify the formation of this interesting geologic structure, we have measured paleomagnetic directions of vertical or steeply dipping Neogene (ca. 15 Ma or younger) diabase dikes in the Takato area, Nagano Prefecture. We found 24 dikes in the field, intruding a late Cretaceous granitoid pluton within the Ryoke metamorphic belt. They form a parallel dike swarm showing a dominant strike of NW. Rock samples were collected from 17 sites and subjected to detailed magnetic cleaning with alternating-field and thermal demagnetization methods to isolate stable high temperature/high coercivity component from natural remanent magnetization (NRM). Results of thermal demagnetization of NRM and rock magnetic investigation using isothermal remanent magnetization (IRM) indicate that magnetite mainly carries the stable component. Site-mean characteristic component directions of reversed polarity were determined for 14 sites, providing an overall mean direction of D = 152.8, I = -55.1 (a95 = 7.2). This direction is characterized by significant counterclockwise deflection from the N-S axis, showing Neogene counterclockwise rotation in the study area. We compared the strike of the MTL (N8E) and the paleomagnetic direction of the study area with those (N55E; D = 9.7, I = 54.5, a95 = 5.2) of the Shitara basin located some 100 km to the SSE, in order to examine the relationship between the detected paleomagnetic rotation and the formation of the convex-northward shape of the MTL. A strike difference and a paleodeclination difference were approximately 47 deg and 37 deg, respectively. This comparison indicates that in the western wing of the bending structure, about 80% of curvature was achieved after 15 Ma and 20% before that time. The later deformation has probably been driven by indentation of the Izu-Ogasawara arc into the Honshu arc starting in the middle Miocene. The earlier curvature formation may causally be related to the clockwise rotation of southwest Japan during the Japan Sea opening stage around 16 Ma. We consider that the MTL was straight before the Miocene Japan Sea opening.