

Paleomagnetic results from andesite dikes in Toki, Gifu Prefecture: implications for dike emplacement and rotation

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High-magnesium andesite dikes of latest Cretaceous or Paleocene age (dated at 70-60 Ma by K-Ar dating) were samples from the Toki area, central Japan, to reveal a paleomagnetic direction and to discuss its implications for volcanic dike emplacement and regional tectonics. More than 100 oriented core samples were taken from a total of 17 dikes. Stepwise demagnetization (AF, thermal) was carried out for all samples, and principal component analysis was performed on demagnetization results to obtain characteristic remanent magnetization (ChRM) components. We determined ENE and down site-mean ChRM directions for 11 dikes. (Titanio-)magnetite is the main carrier of ChRM. Small directional dispersion characterizes the site-mean directions, which suggests that the dikes were all emplaced probably within a short period of time compared to the general timescale of paleosecular variation. The ENE deflection of the ChRM directions indicates clockwise tectonic rotation in the study area. Clockwise rotation of the southwestern Japan arc associated with Paleogene to Miocene opening of the Japan Sea is the most likely cause of the observed paleomagnetic deflection. The angle of deflection is, however, larger than that of the Early Miocene direction in the same area, suggesting possible small clockwise rotation prior to the Early to Middle Miocene major rotation.

Keywords: paleomagnetism, rock magnetism, dike emplacement, tectonic rotation, central Japan, Japan Sea opening