

Paleo- and rock-magnetism of the Upper Pliocene Taro-yama Andesite and Ichiuda Welded Tuff Bed, central Japan

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The Omine area longitudinally extends along the western flank of northern Fossa Magna region, central Japan, bounded by the Otari-Nakayama fault on the east and the active fault system of Itoigawa-Shizuoka Tectonic Line on the west. Late Pliocene to Early Pleistocene fluvial sediments intercalated with numerous pyroclastics crop out in the middle part of the area. The Ichiuda Welded Tuff Bed is subjected to the fault-related NE-SW trending folding structure at Aogu of the Miasa area, and intruded by the Taro-yama Andesite with K-Ar age 2.1 Ma.

PAFD and PThD were performed to the drilled samples of Taro-yama Andesite and Ichiuda Welded Tuff Bed at three and five sites on both limbs of the syncline, respectively. The Taro-yama Andesite yields reverse tilt-corrected site-mean directions at all sites, indicating pre-folding magnetization by fold test. The Ichiuda Welded Tuff Bed also yields reverse one at one site with fresh appearance. Whereas the greenly altered beds at four sites shows normal tilt-corrected site-mean directions by PAFD, and following three temperature-dependent components by PThD: normal below 350 degree, reverse from 350 to 530 degree, and normal above 530 degree, all which agree with fold test.

IRM acquisition, thermal demagnetization of three orthogonal IRM, and thermomagnetic analysis with VSM indicate that the Ichiuda Welded Tuff Bed at all sites contains magnetite and/or titanomagnetites without other magnetic minerals. non-stoichiometric magnetite. Stoichiometric magnetite, and stoichiometric and non-stoichiometric magnetites were identified in the tuff beds with reverse magnetization and three components by PThD, respectively, by low temperature magnetization measurements with MPMS. These facts suggest that the Ichiuda Welded Tuff Bed with single and three magnetization components contains titanomagnetites, and both titanomagnetites and magnetite, respectively. Rock magnetic experiments above and microscopic observations suggest that magnetization of the Taro-yama Andesite is dominated by titanomagnetites under high temperature oxidation state and minor proportion of titanomaghemites.

The Taro-yama Andesite and the Ichiuda Welded Tuff Bed exhibit primary reverse paleomagnetic directions corresponding to the Matsuyama Chron. The Ichiuda Welded Tuff Bed additionally acquired normal components by hydrothermal alteration in the Olduvai Subchron; low and high temperature components are secondary TRM by re-heating for titanomagnetites and CRM by formation of magnetite, respectively.