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Paleomagnetism of the Middle Miocene sediments (Oidawara Formation) of the Mizunami Group, central Japan

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Oriented 1-inch cores were collected from 42 stratigraphic horizons of the Middle Miocene marine sedimentary sequence of the Oidawara Formation, uppermost lithological unit of the Mizunami Group. Magnetic measurement with detailed alternating-field and thermal demagnetizations revealed a magnetic polarity stratigraphy that divides the sedimentary sequence into three polarity zones (lower reversed, middle normal, and upper reversed). This dominantly reversely magnetized sequence can safely be correlated to Chronozone C5Br as the sediments are dated at approx. 15.8-15.6 Ma based on diatom biostratigraphy. The reversed polarity characteristic remanent magnetization (ChRM) directions determined by principal component analysis of stepwise demagnetization data have a SSW declination (approx. 200 deg) after gentle tilt correction, indicating clockwise paleomagnetic rotation. This is consistent with existing paleomagnetic data from the Early Miocene sediments underlying the Oidawara Formation that display more deflected declination. The detected clockwise paleomagnetic rotation is attributed to the clockwise tectonic rotation of the SW Japan arc associated with the Japan Sea opening as has so far been suggested, and the Oidawara Formation records the paleomagnetic information in the course of the clockwise tectonic rotation. The reversed polarity ChRM inclination is significantly shallower than expected at the latitude of the studied area, probably due to inclination shallowing of detrital remanent magnetization. The normal polarity ChRM directions exhibit a northerly declination and a moderate inclination, possibly influenced by a viscous magnetic component that cannot completely be erased by demagnetization.
Keywords: paleomagnetism, Miocene, Oidawara Formation, Mizunami Group, magnetostratigraphy, tectonic rotation