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Cretaceous paleo-latitude of Southwest Japan by paleomagnetism

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Paleomagnetic investigation of Cretaceous Sasayama Group was performed to determine paleo-latitude for the Inner zone of Southwest Japan. The Sasayama Group is distributed in Tanba and Sasayama cities, the middle-eastern part of Hyogo Prefecture. The Sasayama Group is the Lower Cretaceous formation consisting red sandstone. In recent years, the red sandstone of the Group is famous for discovery of born fossils supposed to be Titanosaurus and tooth of Tyrannosaurus. The aim of this study is to estimate the paleo-latitude of Southwest Japan where the dinosaurs lived. The ages of this formation have been determined by K-Ar method and zircon fission track method are from 120 Ma to 140 Ma . This red sandstone of Sasayama Group has been already studied paleomagnetically. We carried out a paleomagnetic investigation of the red beds collected at 8 sites where no paleomagnetic sampling had been performed. The remanent magnetizations were measured with a spinner magnetometer. The lower temperature components demagnetized until 200 degrees C are regarded as secondly magnetization, because their direction is close to that of the present field. The higher temperature components (HTCs) of the unblocking temperature from 630 to 690 degrees C were isolated as the characteristic remanent magnetizations (ChRMs). We added our results to the paleomagnetic data by the previous studies and therefore we used total 35 sites mean directions for the paleomagnetic discussion. The ChRM directions were judged to be syn-tilting magnetization by DC tilt test. We regarded the directions of syn-tilting magnetization as Cretaceous paleomagnetic directions and calculated mean virtual geomagnetic pole (VGP; 29.3 degrees N, 202.3 degrees E, a_{95}=3.4 degrees). This data are in harmony with the Cretaceous paleomagnetic poles reported by the previous studies. The previous data were added to our result and the mean paleomagnetic pole for Southwest Japan was calculated (29.9 degrees N, 199.9 degrees E, a_{95}=5.9 degrees). We compared the mean pole with the Cretaceous paleomagnetic pole for the stable body of the South China Block (SCB; 78.8 degrees N, 214.4 degrees E, a_{95}=2.6 degrees; Tsuneki et al., 2009). As the result, northward translation of 1.1+/-5.2 degrees and clockwise rotation of 61.0+/-6.3 degrees against the stable body of the SCB since the Cretaceous were calculated. From this result, we concluded that the Inner zone of Southwest Japan was situated at nearly similar latitude to the present position during the Cretaceous and rotated clockwise at the time of Japanese Sea opening during mid-Miocene.

Keywords: paleomagnetism, Sasayama Group, Cretaceous, red sandstone, paleo-latitude, Southwest Japan