

Paleomagnetic constraints on the extent of the stable body of the South China Block since the Cretaceous

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We undertook a paleomagnetic investigation of Cretaceous red sandstones at 30 sites within the Yuanma Basin in western Hunan, central South China Block (SCB), China. The aim of this study is to further constrain the extent of the SCB that has been stable since the Cretaceous. We isolated the characteristic directions of higher temperature components (HTCs) with an unblocking temperature of ~650 to 690 degree C by progressive thermal demagnetization and principal component analysis. The optimal concentrations of global mean HTC directions calculated using the direction-correction tilt test were achieved at 92.7 +/- 59.1%, 87.9 +/- 25.0%, and 93.3 +/- 19.7% untilting indistinguishable from 100% untilting, for Early Cretaceous (K1, 13 sites), Late Cretaceous (K2, 17 sites) and K site groupings (K1+K2, 30 sites), respectively. This treatment yielded positive tilt tests, and the HTCs are considered to be primary magnetic components acquired before tilting of the sedimentary layers. Early (K1) and Late (K2) Cretaceous paleomagnetic poles calculated using the site mean directions untilted completely are located at similar positions; this suggests the absence of local rotations linked to Cretaceous strain within the study area. The Cretaceous (K1+K2) mean paleomagnetic pole calculated using virtual geomagnetic poles from all sites is in agreement with previously reported Cretaceous paleomagnetic poles from the eastern and western SCB. This indicates that the Hunan region has been part of the stable body of the SCB since the Cretaceous and that the tectonic influence of the India-Asia collision did not extend to within the stable body of the SCB. The reference Cretaceous pole position (latitude = 80.7 degree N, longitude = 189.7 degree E, A95 = 2.7 degree) calculated using six Cretaceous poles from the stable body of the SCB is similar to those determined from stable Eurasia and the North China Block (NCB). This result indicates that the India-Asia collision caused no relative motion, as detected by paleomagnetic analysis, among stable Eurasia, NCB, and the stable body of the SCB.