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Paleomagnetism of Kiaman-aged basalts from the Tarim Basin

USUI, Yoichi[1*], Tian Wei[2]

[1]Japan Agency for Marine-Earth Science and Technology, [2]Peking University

Most of the numerical geodynamo simulations suggest that the superchron-like geomagnetic behavior results from reduced heat flux across the core-mantle boundary. This mechanism appears to be inconsistent with the Cretaceous Superchron, which was synchronous with vigorous mantle plume activity, implying the Cretaceous Superchron may not be a typical superchron. Kiaman superchron (ca. 310-260 Ma), on the other hand, was synchronous with a supercontinent, with which reduced plate subduction and reduced core-mantle heat flux are expected. A comparison between the Superchrons will clarify the relationship between the mantle activity and geomagnetic activity. However, compared to the Cretaceous Superchron, the geomagnetic behavior during the Kiaman Superchron is far less investigated. Here we report paleomagnetic results from ca. 290 Ma basaltic lavas from the Tarim Basin. Stepwise demagnetizations identify characteristic remanence directions that are consistent with previous researchs. Microscopic conglomerate test using a MI scanning magnetic microscope suggest randomly oriented remanence for basaltic clasts in coarse sandstone interbedded between the lavas. Thus, our basalt samples preserve the primary remanence. Preliminary paleointensity experiments using the Thellier-Coe method recovered intensity of 16.8 micro-T. This value is lower than the present-day field, and significantly lower than some estimates for the Cretaceous Superchron. However, microscopic observation identify multidomain-sized opaque minerals, and more sophisticated technique should be applied to obtain convincing paleointensity estimates.

Keywords: superchron, Permian, supercontinent, magnetic microscopy