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Remagnetization of the Jurassic limestones in the Eastern Qiangtang Terrane (Tibetan Plateau, China): Implications for the India-Eurasia collision

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The Tibetan Plateau is composed of multiple accreted terranes, including (from south to north) the Tethyan Himalaya, the Lhasa, the Qiangtang, the Songpan-Ganzi and the Qaidam-Qilian terranes. The drift history of the Qiangtang Terrane and the timing of the Lhasa-Qiangtang collision are under debate. To contribute to this topic, we paleomagnetically investigate the Middle-Upper Jurassic limestones of the Yanshiping Group in the Zaduo area (32.5°N, 95.2°E), in the Eastern Qiangtang Terrane (Tibetan Plateau, China). A major challenge in paleomagnetism is the possibility of remagnetization that interferes with paleogeographic reconstructions. In this study, both thermal and alternating field demagnetizations were carried out to isolate the characteristic remanent magnetization (ChRM). Despite the positive reversals test, rock magnetic information points to a remagnetized ChRM that resides in stable single-domain (SSD) magnetite grains with cogenetic superparamagnetic (SP) particles. The co-occurrence of SSD and SP magnetites generates distinct rock-magnetic properties often refer to as the 'remagnetized fingerprint' in limestones. This remagnetization process is also manifested by the widespread occurrence of gypsum veinlets in the limestones. The site-mean direction of the 12 sites after tilt-correction is $D_s = 30.6^\circ$, $I_s = 35.6^\circ$, $\kappa_s = 182.9$, $\alpha_{95} = 3.2^\circ$, corresponding to a palaeolatitude of $19.7^\circ \pm 2.8^\circ$ N for the study area. The corresponding palaeopole (59.8°N, 202.7°E with $A_{95} = 2.8^\circ$) points to an NRM acquired after the India-Eurasia collision. The original sediments were likely anoxic because of the high organic carbon fluxes that prevailed during their deposition. After the India-Eurasia collision, it is envisaged that conditions became more oxic, giving rise to oxidation of iron sulphides to authigenic magnetite and the CRM acquisition. The Zaduo area in the Eastern Qiangtang Terrane has experienced $15.7^\circ \pm 3.2^\circ$ (1740 ± 350 km) of latitudinal crustal shortening since the Eocene. In addition, the clockwise rotation responding to the India-Eurasia collision is also detected in the Zaduo area.