Clockwise rotation of the Baoshan block due to SSE-ward extrusion of Tibetan crust

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The collision of India and Eurasia ~50 Ma ago and its ongoing indentation resulted not only in the formation of the Tibetan Plateau and the Himalayan mountain range but also caused significant tectonic deformation in Southeast Asia. The latter consists of different tectonic blocks which amalgamated prior to the collision. In Southeast Asia, western Yunnan is a key area to trace movement around the Eastern Himalayan Syntaxis (EHS). To understand the movement, several models have been proposed in the last decades. Two end-member models are widely considered in literature, comprising the classic 'tectonic escape' model and newer 'crustal flow' models. A wide area of present-day clockwise rotation around the EHS and south-directed movement of crust indicated by GPS geodesy is reported by several authors. Deformation accumulated since the Late Cretaceous can be detected by paleomagnetic declination records.

We present new paleomagnetic data on ~30 Ma old basaltic layers from the Baoshan block in western Yunnan. Dating was done by $^{40}Ar/^{39}Ar$. Magneto-mineralogy has been identified by a rock magnetic study, reflected light and transmitted light microscopy. Microscopy indicates a strong hydrothermal alteration of our sampled sites; the original texture is still preserved. Magnetite and Ti-rich titanomagnetite, respectively, are revealed as main magnetic remanence carrier. Alternating field demagnetization showed significant grouping of remanence directions. The overall in-situ site mean direction is D/I=32.6°/51.8° (α_{95}=11.3, k=15.7; N=12). A fold test yields an optimal degree of untilting at 30%. After tilt correction, the overall site mean direction is D/I=41.8°/47.3° (α_{95}=7.4, k=35.1; N=12) and results in a clockwise rotation of 34.7° with a corresponding rotation rate of 1.16°/Myr. A paleolatitude of 28.4°N is calculated for our sampling area. The clockwise rotation of the Baoshan block since ~30 Ma can be explained in the first stage by clockwise rotation around the EHS by tectonic escape of lithospheric blocks while the Indian indenter pushed northward. After 20 Ma clockwise rotation due to SSE directed extrusion of Tibetan crust by crustal flow likely contributed to the accumulated rotation.

Key words: Paleomagnetism, Tibetan Plateau, Eastern Himalayan Syntaxis, Baoshan block, crust extrusion