Paleomagnetism of the Late Paleozoic limestones of Indochina and its implications for the tectonic evolution of Paleo-Tethys

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ABSTRACT

The first-order geologic evolution from the dispersion of eastern Gondwana to the amalgamation of Eastern Asia has long been a scientific focus, which is beneficial for a wide range of geological studies. The Indochina Block is considered as one of the major blocks that rifted and drifted from the northern margin of eastern Gondwana, and is interpreted to be in close relationship with the South China Block during the early Paleozoic (Metcalfe, 1996, 2013; Torsvik and Cocks, 2013, 2017). Although great endeavor has been made to depict the successive dispersion of eastern Gondwana blocks, it is still a tentative restoration for the Paleozoic period (Metcalfe, 2013; Stampfli et al., 2002; Torsvik and Cocks, 2013, 2017), which is mainly attributed to the paucity of reliable paleomagnetic data.

Hence we carried out paleomagnetic studies on middle Carboniferous and Early-Middle Permian limestones from southernmost Yunnan of China and central Thailand respectively, yielding high- quality data sets for the Indochina Block with probable primary origin. A northward drift from ca. 18.4°S in the middle Carboniferous (Yan et al., 2020), through ca. 16.3°S in the Early-Middle Permian (Yan et al., 2018) to 6.4°S in the Late Permian (Chi et al., 2016) is an clear depiction of the movement of Indochina (Fig. 7). As demonstrated by previous paleomagnetic studies (Cheng et al., 2013; Yang et al., 2016; Song et al., 2017; Ma et al., 2019; Yan et al., 2018, 2019), the quick movement of North Qiangtang from the intermediate latitudes of Southern Hemisphere to the equatorial area happened since the earliest Permian, and the rapid drift of Indochina occurred since the early-middle Permian, while the South China Block held its position in the equatorial area till the middle Triassic. The sequential start of rapid drifting of the blocks might imply that their driven force was possibly sourced from a strike-slip process. It is compatible with the transformation of Pangea from an Early Permian Irvingian Pangea-B to a Late Permian-Early Triassic Wegenerian Pangea-A configuration (Muttoni et al., 2003; 2009).