Goldschmidt 2023 Abstract
https://doi.org/10.7185/gold2023.19063

Redefining and correlating ophiolites by seafloor spreading rate: Tethyan suturing in the Tibetan hinterland

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Sutures in orogenic belts are key to understanding tectonic frameworks on both regional and global scales. However, the traditional method for defining and correlating the extent of sutures based on ophiolite ages and tectonic settings commonly fails to account for the complexity of ocean basin dynamics. In this study, we propose seafloor spreading rate as a new indicator for the correlation of ophiolites and the definition of sutures, and apply it to Tethyan sutures both on the Tibetan scale and across the Eurasia megacontinent. Tethyan suturing in the Tibetan hinterland is strongly debated, mainly due to the unclear relationship between the Bangong–Nujiang (BNS) and Shiquanhe–Yunzhug–Namco (SYNS) sutures. Based on our new geological and geochemical data, the central SYNS ophiolites (Yunzhug–Renco–Namco) are structurally consistent with oceanic crusts generated with high magma budgets, and the basaltic rocks represent typical mid-ocean ridge basalts, thus suggesting an origination from a Late Jurassic fast-spreading mid-ocean ridge. In contrast, the ophiolites in the western SYNS (Shiquanhe–Lagkorco) and most of the BNS have structural features indicative of slow-spreading ocean basins, suggesting mainly an affinity with Early–Middle Jurassic suprasubduction zones. From the combined perspective of ophiolite ages and compositions, and seafloor spreading rate, a redefinition of Tethyan sutures in central Tibet is suggested that the previously-defined SYNS should be geographically subdivided, and its western part is incorporated into the BNS. Such a redefinition of Tethyan sutures provides new insights into the tectonic evolution of the central Tibetan Plateau and is also relevant to Tethyan suturing across megacontinent Eurasia, as well as global studies of the paleogeographic and kinematic evolution of ocean basin dynamics throughout Earth history.