

The Ren Co MOR-type Ophiolite in the North-central Tibetan Plateau: A Fast-spreading Ridge Segment of the Meso-Tethys Ocean?



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Abstract: The Meso-Tethys Ocean is generally considered to have opened in the late Early Permian as a result of the Cimmerian continental block drifting away from the Gondwana supercontinent. This ocean is also termed the north branch of the Neo-Tethys Ocean, and is now represented by the Bangong–Nujiang suture zone in the north-central Tibetan plateau. However, it is still unknown for the evolutionary history for as such a huge ancient ocean basin.

Ophiolites are remnants of oceanic lithosphere and preserve key information in rebuilding the evolutionary history of ancient oceans. In this study, we undertook detailed geological mapping for the Ren Co ophiolite in the middle part of the Bangong–Nujiang suture zone, and a typical Penrose-type ophiolite sequences was newly documented in the Ren Co area. The Ren Co ophiolite comprises serpentinized peridotite, cumulate rock, gabbro/diabase, sheeted dike, massive and pillow lavas, and minor red chert. These rocks exhibit well-preserved mantle and crust rock suites, and show close similarities to oceanic lithospheres at modern fast-spreading ridges. Zircon U–Pb dating for gabbro and plagiogranite yielded ages of 169–147 Ma, which suggest that the Ren Co ophiolites were formed during the Middle to Late Jurassic. Harzburgite in the Ren Co area shows similar features to those of abyssal peridotite indicating the residues of the oceanic mantle. Mafic rocks (basalt, diabase and gabbro) of the Ren Co ophiolite show geochemical features similar to those of typical N-MORB. Moreover, all samples have positive whole-rock $\varepsilon_{\text{Nd}}(t)$, and zircon $\varepsilon_{\text{Hf}}(t)$ and mantle-like $\delta^{18}\text{O}$ values. These features suggest that these rocks were derived from a depleted mantle source, thus the Ren Co ophiolite was typical MOR-type ophiolite. We suggest that the Ren Co ophiolite was

formed in a fast-spreading mid-ocean-ridge (MOR) setting, and they most likely represented the ridge segment of the Bangong–Nujiang Meso-Tethys Ocean. The Bangong–Nujiang Meso-Tethys Ocean was a wide paleo-ocean, and experienced continuous oceanic spreading, subduction, accretion before final Lhasa and South Qiangtang continental assembly.

Key words: Meso-Tethys Ocean, Bangong–Nujiang suture zone, MOR-type ophiolite, mid-ocean-ridge segment

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