

Intra-oceanic subduction initiation induced by oceanic plateau accretion: A case study of central Tibet, western China

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A 167–160 Ma magmatic event related to intra-oceanic subduction in the Bangong Meso-Tethyan Ocean has been frequently recognized in central Tibet [1]. However the mechanism by which this intra-oceanic subduction was initiated has not been explored yet. In this study we present new geochemical and structural data from the ophiolites exposed in central Tibet, western China, in order to understand the geodynamic mechanism of intra-oceanic subduction initiation.

Meso-Tethyan ophiolites are widely distributed in central Tibet, and can be divided into Anduo-Dongqiao, Pengco and Namco-Yongzhu belts from north to south. The ~178 Ma Namco ophiolite composes pillow and massive basalt, dolerite, gabbro and peridotite. The massive basalts are characterred by subaerial eruption and contain phenocrysts of plagioclase, pyroxene and minor olivine. All the basalts show essentially flat chondrite-normalised rare earth element (REE) patterns and primitive mantle normalised multi-element patterns, which are similar to those from Onjong Java oceanic plateau. The Pengco ophiolite consists of pillow lavas and mafic dykes. These pillow lavas are tholeiitic basalts and display flat REE patterns with negative Nb-Ta anomalies on the multi-element diagrams, while the dolerite and gabbro dykes are boninite-like with U-shape REE patterns. In addition, mafic rocks from ~164 Ma Pengco ophiolite have much lower Nb/Yb ratios than those from ~178 Ma Namco ophiolite, which indicates that the melts forming the Pengco ophiolite were most likely derived from a depleted mantle source.

It is therefore likely that the ~178 Ma Namco ophiolite represents the remnants of a Jurassic Meso-Tethyan oceanic plateau, and the ~164 Ma Pengco ophiolite records a later intra-oceanic subduction initiation event. In conjunction with the evidence from the Jurassic (~170 Ma) metamorphic event recorded in Anduo-Dongqiao belt [2], we suggest that a Jurassic Meso-Tethyan oceanic plateau accreted to the continental margin and thus jammed subduction zone at ~170 Ma, and induced intra-oceanic subduction initiation at ~164 Ma.

[1] Zeng *et al.* (2016) *Geochem. Geophys. Geosyst.* **17**, 4859-4877. [2] Zhou *et al.* (1997) *Can. J. Earth Sci.* **34**, 59-65.