

Geochemistry and metamorphic evolution of lawsonite-bearing eclogite in the Changning-Menglian orogenic belt, SE Tibetan Plateau

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The Changning–Menglian orogenic belt (CMOB) in the SE Tibetan Plateau, is considered as the main suture zone marking the closure of the Paleo-Tethys Ocean between the Indochina and Sibumasu blocks. The igneous precursors of the lawsonite-bearing eclogite exhibit REE distribution patterns and trace element abundance similar to those of ocean island basalts (OIB) and are inferred to have been derived from a basaltic seamount in an intra-oceanic tectonic setting. Lawsonite-bearing eclogite is characterized by peak metamorphic mineral assemblages of garnet, omphacite, white mica, lawsonite and rutile, with P-T conditions of 24–26 kbar and 520–530°C. LA–ICP–MS U–Pb spot analyses of zircons from lawsonite-bearing eclogite samples show two distinct age groups. The magmatic zircons show protolith ages of 451 ± 3 Ma, which is consistent with the ages of Early Palaeozoic ophiolitic complexes and ocean island sequences in the CMOB as previous studies. In contrast, metamorphic zircons record consistent Triassic metamorphic ages of 245 ± 2 Ma, which can be interpreted as the timing of closure of the Paleo-Tethys Ocean. The clockwise P – T – t paths and metamorphic ages, as well as the similar protolith signatures for the lawsonite-bearing eclogites in the CMOB and Longmu Co–Shuanghu suture (LCSS) suggests that the two belts formed part of a cold oceanic subduction system in the Triassic. The main suture zone of the Paleo-Tethyan domain extends at least 1500 km in length from the CMOB to the LCSS. The identification of lawsonite-bearing eclogites in the CMOB provides important insights into the tectonic framework and complex geological evolution of the Paleo-Tethys.