

The Lancangjiang zone in southern Yunnan, China: Permo-Triassic continental margin magmatism and the Late Permian Emeishan flood basalt province

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The border region of southwestern China, Burma and Laos is key to the understanding of the Late Paleozoic to Mesozoic evolution of the eastern Paleo-Tethys, when several ill-defined micro-continents amalgamated with the Yangtze craton. The same region is also heavily affected by escape tectonics related to the Tertiary India-Eurasia collision. We studied the igneous rocks in the Lancangjiang zone of southernmost Yunnan, along a major N-S trending Himalayan strike-slip zone morphologically accentuated by the Lancang (Mekong) river. In particular, we focussed on the possibility that this zone may also host displaced remnants of the Late Permian Emeishan flood province which covers large parts of Yunnan and Sichuan a few hundred km north. This perspective is of importance for mineral exploration, because magmatic sulfide (Ni, Cu, PGE) and oxide deposits (V, Ti) are commonly associated with flood basalt events.

Several small biotite granodiorite intrusions close to Jinghong, near the Laos border, yield highly concordant U-Pb zircon ages (MC-ICP-MS) of 283.7 ± 1.1 Ma to 282 ± 1.2 Ma. Sr-Nd isotope data (ϵ_{Nd} -3 to -4; Sr_i 0.709) suggest an origin from Neoproterozoic crust (Nd model ages around 1.3-1.4 Ga) and/or contaminated mantle. The Early Permian age provides evidence for the so far oldest arc-magmatic processes in the southern Lancangjiang zone.

The backbone of the Lancangjiang zone is the prominent 300 x 40 km large Lancang granite batholith which is part of the SE Asian Permo-Triassic granite belts which run from China through Laos and Thailand into Malaysia and Indonesia. The Lincang granite is a K-feldspar megacrystic medium to coarse-grained biotite granite of mostly peraluminous composition. We obtained a U-Pb zircon age of 239.4 ± 1.3 Ma, which is slightly older than previously published U-Pb zircon ages around 230 Ma. Our new age suggests a connection of the Lincang granite with the 239-Ma-old Baimaxueshan granite to the north. Both granite intrusions have currently a lateral offset of about 250 km. Sr-Nd isotopic data on the Lincang granite (ϵ_{Nd} -11 to -16; Sr_i 0.730-0.740) indicate a source from old continental crust.

There is a 10 x 5 km large hornblende gabbro intrusion (Paleng intrusion) close to the Laotian border. The equigranular, medium-grained rock has a U-Pb zircon age of 258.0 ± 1.6 Ma which provides the first evidence that rocks from the Emeishan province indeed extend down to south of Jinghong. 2.4-Ga-old inherited zircons, initial ϵ_{Nd} values of 3.4 to -0.7 and Sr_i ratios of 0.705-0.709 point to variable contamination by Paleoproterozoic crust. These reconnaissance data broadly constrain the geotectonic evolution of the Lancangjiang zone and suggest new Ni-PGE exploration potential.

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