Unravelling granulitic conditions in Early Triassic crustal xenoliths from NE-Qiangtang, Tibet.

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Unlike most "wedge" orogens, the structure and the composition of the Tibetan Plateau lower crust has kept being largely inaccessible otherwise than by geophysical studies and by the few scattered sampling of xenoliths brought to the surface by volcanism. In the Nangqian basin (NE-Qiangtang terrane), Eocene syn-contractional potassic lavas carry partially molten foliated quartzo-feldspathic xenoliths. Zircon LA-ICPMS U-Pb dating of these crustal xenoliths yields a Lower Triassic age of ca. 248.5 Ma, which is interpreted as the protolith crystallization age, with no evidence for any metamorphic zircon growth or resetting. The rare relict ferro-magnesian minerals found (clinopyroxene, amphibole, phlogopite, garnet) are in textural and chemical disequilibrium, making conventional thermobarometry methods inoperable. Nevertheless, the xenoliths have retained unusual metamorphic features which can help unravelling their pre-entrapment metamorphic history. Pure anorthite "patches" with magnetite inclusions are interpreted as pseudomorphs after garnet. Since these patches are often found in contact with clinopyroxene and rutile, these minerals may together represent a former high-pressure assemblage that developed at 1.2-1.5 GPa and 620-730°C. Such pressure record would indicate that 80% of the present-day crustal thickness of the Tibetan Plateau was already acquired in Eocene times. Moreover, corundum-bearing assemblages, interpreted as pseudomorphs after phlogopite, are best explained by kinetic disequilibrium under high-temperature granulitic conditions, suggesting a short-lived metamorphic event. Taken together, this set of new petrological and geochronological data suggests that crustal granulitic metamorphism may not be related to the onset of a general warming of the Tibetan crust sustained until the present, but rather to the punctual injection of mantle-derived melts in the crust before Eocene eruption.

Mots-Clés : Tibetan Plateau, crustal xenolith, corundum, pseudomorph, granulite, LA-ICPMS U-Pb zircon

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