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Metamorphic P–T paths and zircon U-Pb age data for the Paleoproterozoic metabasic dykes of high-pressure granulite facies from Eastern Hebei, North China Craton

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Metamorphic P-T paths and age of metabasic dykes from the Eastern Hebei are very significant in revealing the tectonic framework and evolution of the North China Craton. These dykes crosscut the foliation of late Archean tonalitic-trondhjemitic-granodioritic (TTG) gneisses and supracrustal rocks, and commonly develop a typical high-pressure granulite texture with an assemblage of garnet, clinopyroxene, plagioclase, amphibole, quartz and ilmenite. Garnet is weakly zoned where pyrope and grossular contents decrease from core to rim. Plagioclase occurs in two types, coarse-grained exhibiting composite zoning and fine-grained exhibiting simple zoning with core-rim increasing in anorthite content. Phase modelling using THERMOCALC, together with petrographic observations, suggest that these metabasic dykes may have experienced a clockwise P–T path with peak P–T conditions of 11–13 kbar/790–810 °C. The dykes show weakly right-declined REE patterns and are depleted in Nb, Ta and Ti, similar to the metabasic dykes in the Trans-North China Orogen (TNCO). LA-ICP-MS analysis of zircon grains for two samples yields a metamorphic age of c. 1.82 Ga, which corresponds to the c. 1.85 Ga from granulite in the TNCO that was interpreted to represent the exhumation and cooling age of granulite terranes following a crustal thickening event. Thus, the Paleoproterozoic tectonic event involving activity of metabasic dykes and metamorphism that occurred in the TNCO may have also extended to the Eastern Hebei region.

