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# Discovery of mafic granulite in the Guandishan area of the Lüliang complex, North China Craton: age and metamorphic evolution

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## ABSTRACT

Mafic granulite and amphibolite occur as boudinaged lenses in felsic and metapelitic gneiss in the Guandishan area of the southern Lüliang metamorphic complex. Peak assemblages recorded by large granoblastic minerals yield pressure-temperature ( $P$ - $T$ ) conditions of 790 °C and 9.4 kbar in granulite and > 750 °C and > 6.2 kbar in amphibolite based on standard thermobarometric techniques. Retrogression produced fine-grained resorptive rims in garnet, symplectitic hornblende, orthopyroxene and plagioclase that record  $P$ - $T$  conditions of 560–775 °C and 2.8–7.5 kbar in granulite and 740 °C and 5.7 kbar in amphibolite. Mineral inclusion patterns and major element zoning are consistent with a clockwise  $P$ - $T$  path that ended with nearly isothermal decompression. Uranium-Pb dating of metamorphic zircons from the granulite and host metapelite reveal two discrete, meaningful age groups of metamorphism in the Guandishan area: most metamorphic zircon grains exhibit peak metamorphic growth at 1935–1920 Ma, whereas a smaller, younger group exhibit growth during retrogression between 1860 and 1815 Ma. Regional metamorphism in the Lüliang metamorphic complex was related to the amalgamation of the North China Craton along the Trans-North China Orogen between *c.* 1.95 and 1.80 Ga.

**Keywords:** Granulite; Metamorphic evolution; Zircon U-Pb dating; Guandishan; Lüliang; North China Craton

## 1. Introduction

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