

Decouple between Ti-in-zircon and Zr-in-rutile
thermometry during ultrahigh temperature
metamorphism (Dabie orogen, China)

HAIJIN XU ¹, YANRU SONG ², HENGCONG LEI ³,

¹ School of Earth Sciences, China University of Geosciences,
Wuhan 430074, China; xuhaijin@cug.edu.cn.

² Editorial Office of Journal, China University of Geosciences,
Wuhan 430074, China; songyanru@cug.edu.cn.

³ School of Earth Sciences, East China University of Technology,
Nanchang 330013, China; leihengcong@163.com.

Ti-in-zircon (TIZ) and Zr-in-rutile (ZIR) geothermometers are effective methods for recognition of metamorphic temperature. The results of them should be coupled in theory when zircon and rutile are in equilibration. However, decouple between TIZ and ZIR thermometry during ultrahigh temperature (UHT) metamorphism has been found in the Dabie orogen. TIZ thermometry recorded a peak temperature of 927 ± 38 °C for the granulite-facies metamorphism. Rutile occurs as inclusions in the UHT metamorphic zircon domains, and they were syn-crystallized. Rutile recorded a lower ZIR temperature ranging from 783 to 798 °C, suggesting a decouple of TIZ and ZIR thermometry. We suggest that the diffusion of elements (such as Ti and Zr) between the different minerals (such as zircon and rutile) is the key factor to result in the decouple of TIZ and ZIR geothermometry. Zr diffusion in the rutiles is closely related to the distribution of element, duration of UHT metamorphism and the grain size of rutile.