

A Tarim-South China-North India connection in the periphery of Rodinia: Constraints from provenance of middle Neoproterozoic sedimentary rocks in the Altyn Tagh orogen, southeastern Tarim



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1. Introduction

Locating Tarim during assembly and breakup of Supercontinent Rodinia remains enigmatic, with different paleomagnetic studies advocating a Tarim-Australia linkage or a location between Australia and Laurentia at the heart of unified Rodinia. This study first reported middle Neoproterozoic sedimentary rocks in the Altyn Tagh orogen, southeastern Tarim. A Tarim-South China-North India connection in the periphery of Rodinia was proposed based on comparison of Neoproterozoic geological records and detrital zircon U-Pb-Hf isotopes in the Rodinia terranes.

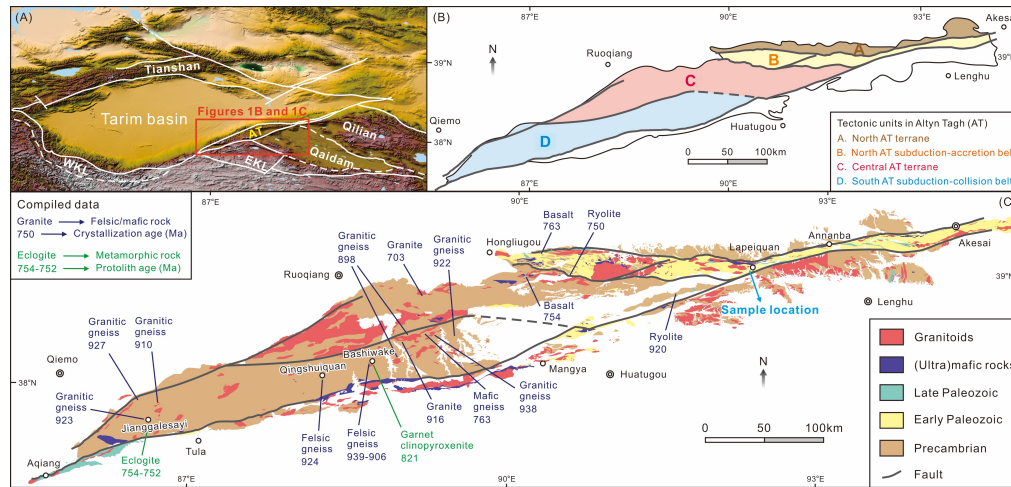
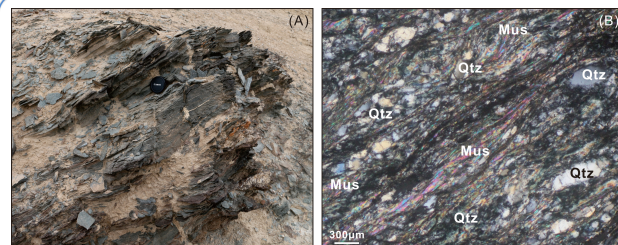


Figure 1. (A) Topographic and location of the Altyn Tagh orogen and adjoining regions. AT- Altyn Tagh, WKL- West Kunlun, and EKL- East Kunlun. (B) Tectonic division of the Altyn Tagh orogen. (C) Geological map of the Altyn Tagh orogen showing compiled ages of Neoproterozoic magmatic rocks and protoliths of metamorphic rocks.

2. Sample



The sampling outcrop consists mainly of phyllite and quartz schist with cleavage and foliation, in which a quartz schist sample was collected.

Figure 2. (A) Field photograph of phyllite and quartz schist in the sampling outcrop. (B) Photomicrograph (crossed nicols). Qtz- Quartz, and Mus- Muscovite.

3. Detrital zircon U-Pb ages

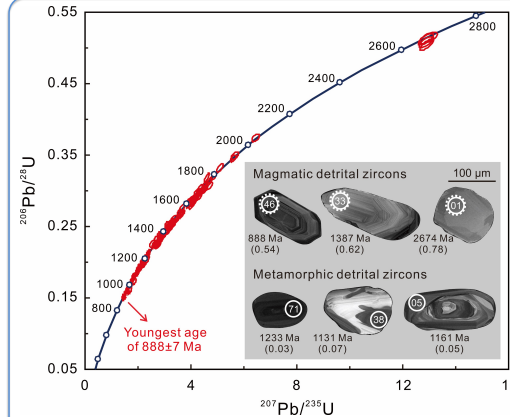


Figure 3. U-Pb concordia diagram and representative cathodoluminescence images of detrital zircons. The youngest zircon yielded 888 ± 7 Ma, interpreted as maximum depositional age. The small and large circles are locations for U-Pb and Hf isotopic analyses, respectively. The numbers in the circles are analytical dots. The values inside the brackets are Th/U ratios.

4. Detrital zircon Hf isotopes

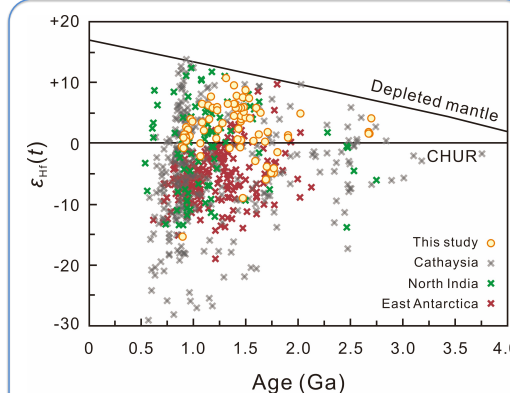


Figure 4. $\epsilon_{\text{Hf}}(t)$ values vs. U-Pb ages. CHUR- Chondrite.

5. Age comparison

Comparable detrital zircon ages at ca. 0.9, 1.3-1.1, and 1.7 Ga indicate a close linkage among southeastern Tarim, Cathaysia, and North India, but exclude a western Australian affinity. A connection between northern Tarim and northern and western Yangtze is also indicated.

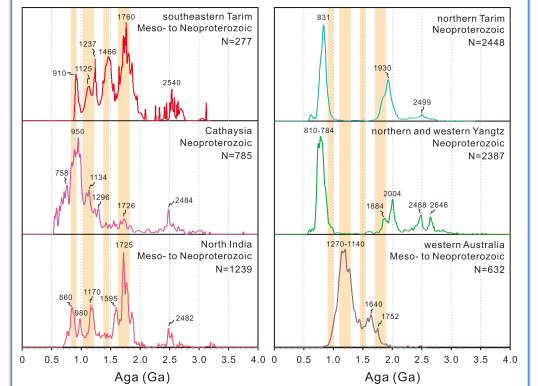


Figure 5. Probability curves for detrital zircon ages.

6. A new perspective

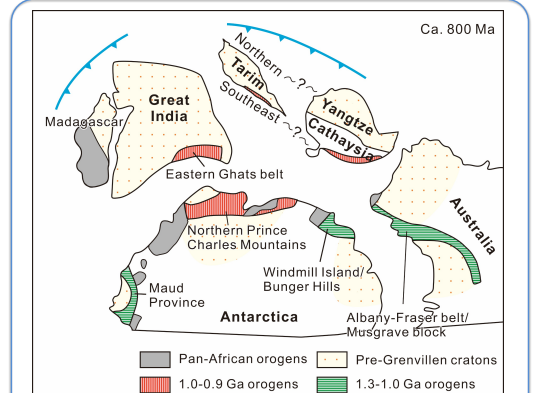


Figure 6. Location of Tarim in Rodinia at ca. 800 Ma.