TRIASSIC COLLISION OF WESTERN TIANSHAN OROGENIC BELT, CHINA: EVIDENCES FROM SHRIMP U-Pb DATING OF ZIRCON FROM UHP ECLOGITIC ROCKS

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A newly recognized ultrahigh-pressure (UHP) terrane in the Chinese Western Tianshan orogenic belt contains blueschists, eclogites and metapelites. This belt extends westward to the "South Tianshan" in Tajikistan, Kyrgyzstan, Kazakhstan and Uzbekistan for more than 2500 km in central Asia. New ion microprobe (SHRIMP) U-Pb dating of zircon from UHP eclogites and metapelites indicates Triassic ages for the collision in western Tianshan. Zircon from four eclogites yield magmatic ages of 310 ~ 413 Ma in the cores and one metapelite contained detrital zircon cores as old as 1886 ± 20 Ma. Zircon rims reveal peak metamorphic ages of 233 ± 4 ~ 225 ± 6 Ma. The geochronologial data suggest that a South Tianshan paleo-ocean was developed between the Tarim continent and the Yili-central Tianshan Craton before the Carboniferous (> 310 Ma). During the Permian-Triassic subduction and continent collision, oceanic basalts and Proterozoic continental materials underwent HP/UHP metamorphism. A new tectonic evolution for HP-UHP metamorphic rocks of the Chinese Western Tianshan orogenic belt represented by HP-UHP metamorphic eclogitic rocks is proposed in the light of recent palaeomagnetic, paleontologic, sedimentary and stratigraphic studies. Before the Late Carboniferous, a South Tianshan paleo-ocean occurred between the Tarim and Yili-central Tianshan cratons. The 310 ± 5 Ma age for the protolith of the eclogites is interpreted as the formation age of this ocean. The northward docking of the Gondwanan Karakoram-Qingtang block to the Cathaysian (Eurasian) Kunlun block was suggested to occur during the Carboniferous-Triassic in the western Kunlun area adjacent to the Chinese western Tianshan. At this time, the south Tianshan paleo-oceanic crust began to subduct northward beneath the Yili-central Tianshan plate to produce arc volcanic rocks in the southern active margin of Yili-central Tianshan craton. According to SHRIMP U-Pb zircon dating of low-P granulites resulted from arc magmatic intrusion, the subduction started at about 290 - 280 Ma (LI & ZHANG, 2004). At last, the south Tianshan oceanic and some continental crustal materials were subducted to mantle depth to form UHP metamorphic rocks (ZHANG et al., 2002; 2003), then exhumed during the Early Triassic collision between the Tarim and Yili-central Tianshan plates (233 ± 4 ~ 225 ± 6 Ma).

References

LI, Q. & ZHANG, L. (2004): Acta Petro. Sinica, 20, 583-594 (in Chinese with English abstract).
ZHANG, L., ELLIS, D. J., ARCULUS, R. J., JIANG, W. & WEI, C.(2003): JMG, 21, 523-529.
ZHANG, L., ELLIS, D.J. & JIANG, W.(2002): Am. Min., 87, 853-860.