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Triassic High-Pressure Metamorphic Belt in the Central Qiangtang Terrane, Northern Tibetan Plateau

ZHAI Qingguo¹, BOR-Ming Jahn², ZHANG Ruyuan², LI Cai³ and WANG Jun¹

1 Institute of Geology, Chinese Academy of Geological Sciences, Beijing, 100037, China

2 Department of Geosciences, National Taiwan University, Taipei 106, Taiwan

3 School of Earth Science, Jilin University, Changchun, Jilin, 130061, China

High-pressure and low-temperature (HP/LT) metamorphic eclogites and blueschists are generally considered as a proxy of subduction-zone metamorphism. A ~500 km-long HP/LT metamorphic belt was recently “discovered” in the middle of the Qiangtang terrane in northern Tibet. We present new results of petrological, geochemical, Sr-Nd isotopic and zircon age studies of the HP/LT rocks from this belt, and discuss some geodynamic implications. Our petrological and mineralogical data revealed a four-stage metamorphic evolution: (1) a prograde blueschist facies; (2) a peak eclogite facies; (3) a decompression blueschist facies and (4) a retrograde greenschist facies. The Grt-Omp-Phn geothermobarometry yielded a peak eclogite facies condition of ~450°C and ~2.2 GPa. Geochemical analyses show that the eclogites and blueschists have grossly similar bulk compositions (basaltic), but they can be divided into two groups based on their TiO₂ contents. The low Ti-group rocks (TiO₂ < 2.75 wt %) exhibit REE distribution patterns and trace element abundances similar to enriched mid-ocean ridge basalts (E-MORB), whereas the high Ti-group rocks (> 2.75 wt %) are more akin to ocean island basalts (OIB). All samples

show positive $\varepsilon_{\text{Nd}}(T)$ values (0.4 to 6.3), suggesting that the basaltic protoliths of the eclogites/blueschists were originated from a long-term depleted mantle. However, their geochemical characteristics require that the depleted mantle be metasomatized and enriched in LIL and LREE shortly before the generation of the basaltic protoliths. Zircon U-Pb dating gave 230 ± 3 Ma and 237 ± 4 Ma for two eclogite samples. The ages are interpreted as the time of eclogite facies metamorphism. Moreover, $^{40}\text{Ar}/^{39}\text{Ar}$ dating of phengite from the eclogite and Grt-Phn schist yielded ~220 Ma, which is interpreted as the time of exhumation to the middle crust. The recognition of oceanic basalts suggests that a Paleozoic ocean was present in central Qiangtang. This ocean was probably the western extension of the Changning-Menglian Paleo-Tethys in the eastern margin of the Tibetan plateau. The eclogite and blueschist were formed by northward subduction of this Paleozoic ocean in the Triassic. More tectonic implications will be presented.

Key words: Tibet; Qiangtang; eclogite; geochemistry; geochronology; Paleo-Tethys

* Corresponding author. E-mail: zhaiqingguo@126.com