Exhumed sub-continental arc lithospheric mantle and implication for continental subduction during arc-continent collision in the southern Central Asian Orogenic Belt

KEQING ZONG[1*], ZAICONG WANG[1], YU YUAN[1], JINGLIANG GUO[1], HUAI CHENG[1], YUANYANG YU[1]

[1] State Key Laboratory of Geological Processes and Mineral Resources, School of Earth Sciences, China University of Geosciences, Wuhan 430074, China

Orogenic peridotite massifs exhumed from the lithospheric mantle that is generally coupled evolution with the overlying crust have a potential to constrain the subduction and collision process in the orogen. Here an orogenic peridotite massif was first reported in the Dunhuang high-pressure metamorphic terrane (DHMT) which is employed to constrain the detailed arc-continent collision process in the southern Central Asian Orogenic Belt (CAOB) that is one of the most complex accretionary orogens on the Earth. The Dunhuang orogenic peridotites can be classified into refractory and refertilized ones based on petrological and geochemical investigations. The refractory peridotites define rhenium depletion model age (T_{RD}) of 1.3 − 0.8 Ga which is decoupled from the Archean-Paleoproterozoic crystalline basement in the DHMT, but is coupled with the Mesoproterozoic-Neoproterozoic crystalline basement in the South Beishan magmatic arc that located in the north of the DHMT. Moreover, the refertilized mantle peridotites give a consistent osmium model age (T_{MA}) (0.7 − 0.5 Ga) and T_{RD} (0.6 − 0.3 Ga) which is not only roughly coeval with early Paleozoic HP metamorphism (0.44 − 0.40 Ga) in the DHMT but also coupled with early Paleozoic flare up (0.47 − 0.40 Ga) in the South Beishan magmatic arc. These results demonstrate that Dunhuang orogenic mantle peridotites are the exhumed sub-continental arc lithospheric mantle wedge beneath the South Beishan magmatic arc, implying the northward continental subduction of the DHMT under the Beishan magmatic arc in the early Paleozoic. This early Paleozoic arc-continent collision and continental subduction play an important role in the evolution of the southern CAOB.