

Early Paleozoic polyphase metamorphism in the northern Tibet, China

JIANXIN ZHANG, SHENGYAO YU AND C. G. MATTIENSON

¹Institute of Geology, CAGS, China

²Department of Geological Sciences, Central Washington University, USA

Two dominant metamorphic belts, i.e. North Qilian (NQL)-North Altun (NAT) HP/LT metamorphic belt and north Qaidam (NQD)-south Altun (SAT) UHP metamorphic belt are located in the northern Tibet. The NQL-NAT HP/LT metamorphic belt mainly consists of blueschist, eclogite and high pressure metasediments. Eclogites were formed under the metamorphic conditions of 420-550°C and 2.1-2.5GPa, and at 510 to 460Ma. The HP/LT metamorphic belt is associated with ophiolite, island arc, back-arc basin, suggesting that the NQL-NAT is a typical accretion orogen. In contrast, the NQD-SAT UHP metamorphic belt is characterized by eclogite, garnet peridotite enclosed within continental orthogneiss and paragneiss. They were subjected to UHP metamorphism at $T > 700^{\circ}\text{C}$ and $P > 2.7$ GPa. Field relationship, petrology and geochronology suggest that the NQD-SAT UHP metamorphic belt was resulted from the deep subduction of continental crust rocks. HP granulite with single metamorphic history and similar age to that of UHP eclogite was also recognized. Penecontemporaneous metamorphic ages but different geothermal gradients between HP granulites and related UHP eclogite define a possible paired metamorphic belt, which may be considered as the diagnostic characteristic of collisional orogens. NQD-SAT commonly experienced a Barrovian-type metamorphic overprint about 20 – 50 Ma later than UHP metamorphism later history. The polyphase metamorphism in the northern Tibet can be linked to the accretion and collision orogenesis related to the evolution of Prototethys through early Paleozoic.