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两条不同类型的HP/LT和UHP变质带对祁连-阿尔金早古生代造山作用的制约

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摘要:

在祁连-阿尔金造山带的南北两侧, 分别出露有北祁连-北阿尔金HP/LT变质带和柴北缘-南阿尔金UHP变质带。北祁连-北阿尔金HP/LT变质带主要由蓝片岩、低温榴辉岩和高压变沉积岩所组成, 榴辉岩形成的温压条件为420~570°C和2.0~2.5GPa, 形成时代为510~440Ma。含硬柱石榴辉岩和含纤柱石高压变沉积岩的存在显示洋壳俯冲把大量水带到地幔深处。与HP/LT变质带伴生的早古生代蛇绿岩、俯冲增生杂岩、岛弧、弧后盆地等显示北祁连-北阿尔金为典型的早古生代增生造山带。柴北缘-南阿尔金UHP变质带由榴辉岩、石榴橄榄岩、高压麻粒岩及具有陆壳性质的正副片麻岩所组成, 它们遭受了超高压变质作用 ($T > 700^\circ\text{C}$, $P > 2.8\text{GPa}$), UHP变质时代为500~420Ma, 榴辉岩的原岩时代为750~850Ma, 形成于新元古代的大陆裂谷环境。野外地质关系、岩石学及年代学研究显示柴北缘-南阿尔金HP-UHP变质带为大陆深俯冲作用的产物。在柴北缘-南阿尔金UHP变质带中, 超高压榴辉岩和高压麻粒岩同时形成在不同的构造热环境中, 构成大陆俯冲及碰撞造山带中的“双变质带”, 同时也显示柴北缘-南阿尔金造山带具有典型碰撞造山带的特征。祁连-阿尔金造山带南北两侧几乎同时发生增生造山作用和碰撞造山作用, 构成由不同造山类型所组成的复合造山带。南北两侧的HP/LT变质带和UHP变质带以及可能存在的不同类型双变质带制约了祁连-阿尔金造山带早古生代的造山性质、造山类型以及造山机制。

英文摘要:

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 and southern sides of Qilian-Altun orogen, respectively. NQL-NAT HP/LT metamorphic belt mainly consists of blueschist, low-temperature eclogite and high pressure metasedimentary rocks. Eclogites were formed under the metamorphic conditions of 420~570°C and 2.1~2.6GPa, and at 510~440Ma. The lawsonite-bearing eclogites and carpholite-bearing high pressure metasedimentary rocks indicate the existence of cold subduction zone gradient and cold subduction brought a large amount of H₂O to the deep mantle in the Early Paleozoic times. HP/LT metamorphic belt is associated with ophiolite, subduction-accretion complex, island arc and back-arc basin, suggesting that the NQL is a typical Early Paleozoic accretion orogenic belt. In contrast, the NQD-SAT UHP metamorphic belt is composed of eclogite, garnet peridotite, high pressure granulite and continental orogneiss and paragneiss. These rocks were subjected to UHP metamorphism at $T > 700^\circ\text{C}$ and $P > 2.7\text{GPa}$. Geochronology suggests that the UHP metamorphism occurred at 500 to 420Ma, and the protolith age of eclogite at 850~750Ma, related to a Neoproterozoic continental rift origin. Field relationship, petrology and geochronology suggest that the NQD-SAT UHP metamorphic belt was resulted from the deep subduction of continental crust rocks. In the NQD-SAT UHP metamorphic belt, UHP eclogite and HP granulite produced in different thermal environments at same time, suggesting a “paired metamorphic belt” related to continental subduction and collision, and also implying that the NQD-SAT is a typical Early Paleozoic collision orogen. These data indicate accretion orogeny and collision orogeny developed synchronously in two side of Qilian-Altun orogenic belt, and formed a composite orogen as a result of different type of orogeny. HP/LT metamorphic belt and HP/UHP metamorphic belt control the orogenic type and mechanism of Qilian-Altun orogen in Early Paleozoic time.

关键词: [HP/LT变质带](#) [UHP变质带](#) [祁连-阿尔金造山带](#) [增生造山](#) [碰撞造山](#)

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