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喜马拉雅东构造结高压麻粒岩PT轨迹、锆石U-Pb定年及其地质意义

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摘要：

喜马拉雅东构造结出露了一套基性高压麻粒岩，其峰期矿物组合为石榴石+单斜辉石+石英+金红石+斜长石，利用相平衡计算其峰期温压条件为904℃、1.37GPa，利用锆石U-Pb定年方法确定其变质年龄为20.7±2.3Ma。角闪斜方辉石麻粒岩为其第一阶段退变产物，其变质矿物组合为斜方辉石+角闪石+斜长石+石英+钛铁矿+磁铁矿，温压条件为压力小于0.6GPa，温度为720~760℃。角闪岩相退变矿物组合为角闪石+斜长石+石英+钛铁矿+磁铁矿，温度小于745℃，压力小于0.6GPa。在角闪斜方辉石麻粒岩中变质锆石获得的定年结果为9.38±0.22M，根据锆石中角闪石+斜长石+石英的矿物包体特征，确定该年龄代表角闪岩相退变质年龄。据此，确定了喜马拉雅东构造结基性高压麻粒岩的PT轨迹为顺时针2阶段折返过程，即第一阶段发生在20Ma左右的由高压麻粒岩相到角闪岩相退变阶段，第二阶段发生在9Ma左右的从角闪岩相深度折返到地表的阶段，计算得到其折返速率分别为2.4mm/y和2.3mm/y，这2个阶段的折返与目前通常认为的青藏高原2个主要抬升阶段是基本一致的。

英文摘要：

Along Yalu-Tsangpo River, Eastern Himalayan Syntaxis, expose high-pressure mafic granulites. Peak stage assemblage of high-pressure mafic granulite is garnet+clinopyroxene+quartz+rutile. The reaction plagioclase+orthopyroxene→clinopyroxene+garnet+quartz indicates peak pressure exceeded the orthopyroxene-out pressure. The peak conditions of high-pressure mafic granulite are 904℃ and 1.37GPa. Zircon U-Pb dating shows that the age of high pressure granulite facies metamorphism is 20.7±2.3Ma. Amphibole-orthopyroxene granulite is the product of the first stage retrograde metamorphism, and the assemblage is orthopyroxene+amphibole+plagioclase+quartz+ilmenite+magnetite, and the P-T conditions are <0.6GPa and 720~760℃. The overprinted amphibolite facies assemblage is amphibole+plagioclase+quartz+ilmenite+magnetite and the P-T conditions are <0.6GPa and <745℃. The age of metamorphic zircon in amphibole-orthopyroxene granulite is 9.38±0.22Ma. According to the inclusions amp+pl+qz in such zircon, this age represents the age of amphibolite facies metamorphism. Therefore, the P-T-t path of the high-pressure granulites from Eastern Himalayan Syntaxis is clockwise and it represents a two-stage exhumation process, i.e. the first stage of exhumation: from the depth of high-pressure granulite facies to the depth of amphibolite facies beginning at about 20Ma; the second stage of exhumation: from the depth of amphibolite facies to the earth surface beginning at about 9Ma. According the P-T conditions and the results of U-Pb zircon dating, the average exhumation rates for these two stages are 2.4mm/y and 2.3mm/y, respectively. Our study is consistent with the opinion of two-stage uplifts of Tibetan Plateau and further proves that the uplift of Tibetan Plateau connects tightly with the exhumation of subduction zone.

关键词：高压麻粒岩 PT轨迹 锆石U-Pb定年 喜马拉雅东构造结 青藏高原隆升

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