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CCSD超高压变质岩绿辉石中的石英出溶体及其大陆动力学意义

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梁金龙 孙晓明 徐莉 翟伟 汤倩 梁业恒

中山大学地球科学系，中山大学地球科学系，中山大学地球科学系，中山大学地球科学系，中山大学地球科学系，中山大学地球科学系 广州，510275，广州，510275，中国科学院同位素年代学和地球化学实验室，广州，510640，广州，510275，广州，510275，广州，510275，广州，510275

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摘要：

单斜辉石中发育石英出溶体是UHP变质作用的典型矿物学标志之一,在世界上著名UHP变质地体中屡有发现。本文利用激光Raman光谱和电子探针分析在中国大陆科学钻探先导孔(CCSD-PP1)榴辉岩岩心的绿辉石中发现了大量石英(棒)出溶现象。通过与CCSD主孔榴辉岩各种赋存形式的绿辉石成分对比,发现含石英出溶体的绿辉石具有超硅特征,这是出溶现象发生的决定性因素之一。结合高压实验岩石学资料,提出在UHP变质的峰值期部分Si进入六次配位的Si-O八面体位置,压力降低这部分Si析出,形成石英出溶体的出溶机制。结合新的矿物学研究进展,认为绿辉石中出溶石英所标志的压力应远大于前人提出的2.5GPa,意味着苏鲁超高压变质带陆壳物质的俯冲深度要大于目前一般认为的80~120km范围。

关键词：绿辉石 石英出溶体 榴辉岩 大陆动力学 CCSD

Quartz Exsolutions in Omphacites of Ultrahigh Pressure Metamorphic Rocks from CCSD and Its Significance of Geodynamics

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LIANG Jinlong~ 1),SUN Xiaoming~ 1,2),XU Li~ 1),ZHAI Wei~ 1),TANG Qian~ 1),LIANG Yeheng~ 1) 1) Department of Earth Sciences,Sun Yat-Sen University,Guangzhou 5102752) Key Laboratory of Isotope Geochronology and Geochemistry,Guangzhou Institute of Geochemist

Fund Project:

Abstract:

Quartz bar (or needle) exsolutions from clinopyroxenes are considered as one of the diagnostic indicators in the ultrahigh-pressure metamorphism, and were frequently identified from several UHP metamorphic belts in the world. Exsolutions in omphacites in eclogites from the Chinese Continental Scientific Drilling Project main hole (CCSD-MH) and Pre-pilot 1(CCSD-PP1) were studies by using laserRaman and electron microprobe analysis, and numerous parallel quartz bars (or needles) were found. For comparison, omphacites in CCSD eclogites without any quartz exsolution were also analysed. The results indicate that the omphacites with quartz exsolution is supersilicic. Ultrahigh-pressure experiments shown that part of silica can form octahedral coordination structure, if pressure is high enough. It's proposed that decline of pressure will facilitate quartz exsolution. The peak pressure of UHP metamorphism indicated by quartz exsolutions in the CCSD omphacites is much higher than 2.5GPa, which was estimated by the previous researchers based on facies transformation of quartz-coesite and graphite-diamond, suggests that subduction depth of the Su-Lu UHP metamorphic belts may be greater than commonly recognized 80~120km.

Keywords:omphacite quartz exsolutions eclogite geodynamics CCSD

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