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佳木斯地块东北缘早二叠世六连岩体的岩浆混合成因: 岩相学、年代学和地球化学证据

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摘要:

本文报道了佳木斯地块东北缘六连岩体中主岩花岗闪长岩和暗色微粒包体的岩相学、锆石U-Pb年代学、全岩地球化学以及锆石Hf同位素资料,以确定该岩体的形成时代、岩石成因及其构造属性。主岩花岗闪长岩和暗色微粒包体中角闪辉长岩分别获得了284Ma和278Ma的成岩年龄,表明六连岩体形成于早二叠世而非前人认为的晚印支期。包体具有岩浆结构,部分包体存在塑性流变特征,包体中可见淬冷边、反向脉和针状磷灰石,包体和主岩中均发育矿物异常共生或不平衡结构,结合主岩和包体的年代学和地球化学特征可以判定六连岩体为早二叠世岩浆混合作用的产物。全岩地球化学和锆石Hf同位素特征揭示出,六连岩体中主岩和包体的原始岩浆分别起源于新元古代增生的深部陆壳基性火成岩和受俯冲流体交代的亏损地幔楔的部分熔融。结合同时代火成岩组合的空间变异特征以及区域构造演化历史,认为佳木斯地块东北缘早二叠世六连岩体形成于活动大陆边缘环境,其地球动力学机制与佳木斯地块东侧古洋板块的西向俯冲作用有关。

英文摘要:

This paper reports petrographical, zircon U-Pb dating, whole-rock geochemical and zircon Hf isotope data of the host granodiorites and mafic microgranular enclaves (MMEs) from the Liulian pluton at the northeastern margin of the Jiamusi massif in NE China, with the aim of constraining formation time, petrogenesis, and tectonic setting of the pluton. The zircon U-Pb ages of 284Ma and 278Ma have been obtained from the host granodiorites and the hornblende-gabbros from MMEs, respectively, indicating that the Liulian pluton formed in Early Permian rather than previously believed late Indo-Chinese epoch. The MMEs display igneous-texture and some of them are characterized by plastic flow deformation. Quenched margin, back veins and acicular apatite can be found in some MMEs. The disequilibrium mineral associations or disequilibrium textures are developed in both MMEs and host granodiorites. Combined with the zircon U-Pb age and geochemical data, we can distinguish that Liulian pluton is the product of magma mixing in Early Permian. The whole-rock geochemical and zircon Hf isotopic data show that the primary magma of the host granodiorite could be derived from partial melting of the mafic igneous rocks in the lower crust which originated from depleted mantle in Neoproterozoic, and the primary magma of MMEs was derived from the partial melting of the depleted mantle wedge that had been metasomatized by fluids released from a fossil subducted slab. Considering the spatial variation of coeval igneous rock associations and regional tectonic evolution, we conclude that the Early Permian Liulian pluton occurred in an active continental margin setting related to the westward subduction of Paleo-oceanic plate beneath the Jiamusi massif.

关键词: [岩浆混合作用](#) [年代学](#) [地球化学](#) [Hf 同位素](#) [早二叠世六连岩体](#) [佳木斯地块东北缘](#)

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