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海拉尔盆地基底晚古生代adakite的发现及其地质意义

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摘要:

海拉尔盆地的前中生代基底隶属中亚造山带东段的兴蒙造山带。在盆地基底地层中发现了具有adakite成分特征的粗面安山岩、英安岩和闪长玢岩。这些火成岩与晚古生代沉积地层交互或伴生,共同构成晚中生代裂陷盆地的基底。地球化学研究表明,这些火成岩基本上属于高钾钙碱性和准铝质岩石系列,具有高 SiO_2 和 Al_2O_3 含量,高Sr、Sr/Y和La/Yb值,富集轻稀土(LREE),亏损重稀土(HREE)、Y和高场强元素(HFSE),Eu表现弱的负异常或轻微的正异常,相容元素Mg、Cr和Ni含量低,这些特征与增厚下地壳部分熔融成因的adakite非常相似,而明显不同于典型的由俯冲洋壳熔融形成的adakite。样品的 $(^{87}\text{Sr}/^{86}\text{Sr})_i$ 值基本一致为0.7041, $(^{143}\text{Nd}/^{144}\text{Nd})_i$ 值为0.51243~0.51247, $\epsilon_{\text{Nd}}(t)$ 为正值(+3.7~+4.5),显示其岩浆源区可能源于弱亏损地幔,或亏损地幔受到地壳物质混染。本文认为海拉尔地区晚古生代adakite型岩浆很可能是由当时新底侵的玄武质下地壳在角闪岩相向榴辉岩相过度或榴辉岩相条件下部分熔融形成。这些adakite岩石的出现反映了兴蒙造山带晚古生代受到了古亚洲洋的俯冲消减引起的强烈的地幔玄武质岩浆底侵作用,并由此导致地壳垂向上显著的增生加厚过程。

英文摘要:

The pre-Mesozoic basement of the Hailaer Basin is one part of the Xing'an-Mongolia Orogenic Belt in the eastern Central Asia. Trachy-andesite, dacite and diorite in the basement have unique chemical and trace element signatures identical to adakite. These igneous rocks developed among the Late Paleozoic sedimentary succession as interlayers. All of them consist of the basement of the Late Mesozoic rifted basins. The intermediate igneous rocks are characterized by high-K calc-alkaline and metaluminous series, high SiO_2 , Al_2O_3 and Sr contents, high Sr/Y and La/Yb ratios, enrichment in light rare earth elements (LREE) and strong depletion in heavy rare earth elements (HREE), Y and HFSE, and weak positive or negative Eu anomaly, low Mg, Cr and Ni contents. These rocks are similar to one type of adakites, which formed from the thickened lower crust through partial melting, and differ from the typical adakite, which is from the partial melting of the subducted oceanic slab. The $(^{87}\text{Sr}/^{86}\text{Sr})_i$ values of all samples are equal (0.7041), while the $(^{143}\text{Nd}/^{144}\text{Nd})_i$ values are between 0.51243 and 0.51247. All the $\epsilon_{\text{Nd}}(t)$ values display positive with a range from +3.7 to +4.5. These Nd and Sr isotopic composition features indicate that the source rocks of these adakite-type rocks are from a weakly depleted mantle, or a depleted mantle contaminated by the crustal materials. These adakite-type rocks were likely derived from the partial melting of new underplated basaltic rocks under the conditions of amphibolite to eclogite transition in the intracontinental environment of Xing'an-Mongolia Orogenic Belt during the Late Carboniferous time. The occurrence of these adakite rocks indicates that the Xing'an-Mongolia Orogenic Belt experienced an important process of the underplating of mantle-derived basaltic magmas and the vertical crustal growth in Late Paleozoic, which were probably related to the subduction of the Paleo-Asian Ocean slab.

关键词: [海拉尔盆地基底](#) [晚古生代](#) [埃达克岩](#) [地球化学](#) [地壳垂向增生](#)

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