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海拉尔盆地中生代火山岩锆石U-Pb年代学及其地质意义

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摘要:

本文报导了海拉尔盆地巴彦舒凹陷楚2井南屯组( $K_1n$ )和楚3井兴安岭群( $J_3xn$ )6个流纹岩中锆石的LA-ICP-MS U-Pb定年结果,以便精确限定盆地内火山岩形成的时代以及火山活动与盆地形成和演化之间的关系。6个流纹岩中的锆石均呈自形-半自形晶,显示典型的岩浆生长环带或条痕状吸收,并具有较高的Th/U比值(0.48~2.41),表示其为岩浆成因。楚2井南屯组( $K_1n$ )1个流纹岩中锆石的 $^{206}\text{Pb}/^{238}\text{U}$ 年龄介于123~134Ma之间,其加权平均年龄为 $127\pm 2\text{Ma}$ ,代表了该火山岩的形成时代为早白垩世晚期;楚3井兴安岭群5个样品的锆石 $^{206}\text{Pb}/^{238}\text{U}$ 年龄分别为 $120\pm 1\text{Ma}$ 、 $127\pm 4\text{Ma}$ 、 $125\pm 1\text{Ma}$ 、 $125\pm 1\text{Ma}$ 和 $126\pm 1\text{Ma}$ ,表明其形成时代为早白垩世晚期,并非前人确定的晚侏罗世。除了上述年龄外,流纹岩中还存在140~168Ma的捕获锆石,这与区域上出露的塔木兰沟组火山岩的形成时代相吻合。根据上述定年结果并结合前人的资料,海拉尔盆地南屯组和兴安岭群火山岩的形成时代为早白垩世晚期,火山活动时间为中生代晚侏罗世-早白垩世,这与我国东部中生代火成岩活动的年代一致。从东北地区中生代火山岩的定年结果及其空间展布来看,海拉尔盆地的形成与演化应与环太平洋构造体系有关,即古太平洋板块的俯冲作用。

英文摘要:

This paper presents the LA-ICP-MS zircon ages of 6 rhyolite samples in the Nantun Formation ( $K_1n$ ) from Well Chu 2 and in the Xing'anling Group ( $J_3xn$ ) from Well Chu 3, to constrain the volcanic rocks' exact formation time and their relation to the formation and evolution of the Hailaer basin. Zircon grains from the 6 rhyolite samples are euhedral to subhedral in shape and show the typical oscillatory zoning or striped absorption with Th/U ratios range from 0.48 to 2.41, implying that they should be magmatic in origin. The  $^{206}\text{Pb}/^{238}\text{U}$  ages of zircons from the rhyolite sample of the Nantun Formation ( $K_1n$ ) in Well Chu 2 range from 123Ma to 134Ma, with a weighted mean  $^{206}\text{Pb}/^{238}\text{U}$  age of  $127\pm 2\text{Ma}$ , representing the formation time of the volcanic rocks, is Early Cretaceous. Zircon grains in other five rhyolite samples from the Xing'anling Group ( $J_3xn$ ) in Well Chu 3 show weighted mean  $^{206}\text{Pb}/^{238}\text{U}$  ages of  $120\pm 1\text{Ma}$ ,  $127\pm 4\text{Ma}$ ,  $125\pm 1\text{Ma}$ ,  $125\pm 1\text{Ma}$  and  $126\pm 1\text{Ma}$ , respectively, indicating that the volcanic rocks was formed in Early Cretaceous rather than Late Jurassic as previously believed. Besides these ages, there are some captured zircons in rhyolites with the ages of 140~168Ma, which coincide with the formation time of volcanic rocks in the Tamulangou Formation in the same region. Our data shows that the volcanic rocks in the Nantun Formation and the Xing'anling Group formed in Early Cretaceous, which are close to the age of the Mesozoic volcanic activities in eastern China. Combined with the spatial variations of ages of the Mesozoic volcanic rocks in northeastern China, it is suggested that the formation and evolution of the Hailaer basin are related to the subduction of the Paleo-Pacific plate.

关键词: [海拉尔盆地](#) [锆石U-Pb定年](#) [流纹岩](#) [中生代](#) [南屯组](#) [兴安岭群](#)

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