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柴北缘都兰UHP地体中两期不同性质的岩浆活动: 对碰撞造山作用的启示

作者	单位	E-mail
于胜尧	中国地质科学院地质研究所, 北京 100037 ; 大陆构造与动力学国家重点实验室, 北京 100037 ;	
张建新	中国地质科学院地质研究所, 北京 100037 ; 大陆构造与动力学国家重点实验室, 北京 100037 ;	zjx66@yeah.net
侯可军	中国地质科学院矿产资源研究所, 北京 100037	

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摘要:

本文报道了对柴北缘都兰地区英云闪长岩、花岗岩的地球化学、锆石U-Pb定年和Hf同位素的研究结果。锆石U-Pb定年结果表明, 英云闪长岩侵位时代为432~434Ma, 并显示出类似于埃达克质岩石的地球化学特征: (1)高SiO₂、富Na₂O、贫K₂O、过铝质; (2)高Sr、低Y和相应的高Sr/Y值; (3)高La/Yb和低Yb; (4)轻重稀土分馏程度高, 亏损重稀土; (5)富集Ba、Sr等大离子亲石元素, 而亏损Nb、Ta等高场强元素。结合英云闪长岩高的 $\epsilon_{\text{Hf}}(t)$ 值(3.3~10.7)和年轻的地壳模式年龄(732~1207Ma), 可以认为本区英云闪长岩源自于增厚下地壳的部分熔融作用。锆石U-Pb定年结果表明, 晚期花岗岩的结晶时代为382~391Ma, 并显示出类似于S型花岗岩的地球化学特征: (1)高SiO₂, 低MgO和高K₂O的特征, K₂O/Na₂O>1; (2) A/CNK几乎全部大于1, 显示过铝质的特征; (3)轻、重稀土分馏程度低, (La/Yb)_N=2.22~9.62, 但具明显的负Eu异常($\delta\text{Eu}=0.27\sim0.81$); (4)强烈亏损Nb、Ta、Sr和Ti等元素, 轻微亏损Ba元素。在综合对比花岗岩形成年龄与区域高压-超高压变质时代的基础上, 结合地球化学特征, 推断都兰地区花岗岩体可能形成于后碰撞造山伸展作用阶段, 并可能是由其围岩富铝质片麻岩部分熔融形成, 并可能有少量地幔物质的添加。

英文摘要:

In this article, we report the geochemical, zircon U-Pb dating and Hf isotopic data for tonalite and granite from Dulan area, the North Qaidam Mountains. Zircon U-Pb dating result indicates that the tonalite was emplaced at 432~434 Ma, which shows a geochemical resemblance to adakite: (1) high SiO₂, enriched in Na₂O and depleted in K₂O, and peraluminous; (2) high Sr and low Y, and thus corresponding to high Sr/Y; (3) high La/Yb and low Yb; (4) depleted in HREE, and thus strongly partition between HREE and LREE; (5) enriched in LILE including Ba and Sr, depleted in HFSE such as Nb and Ta. In combination with the high $\epsilon_{\text{Hf}}(t)$ values (3.3~10.7) and young crustal model age of 732~1207Ma, the tonalite was suggested to derived from partial melting of thickened basaltic lower crust. Zircon U-Pb dating result indicates that the granite was emplaced at 382~391Ma, and the granite shows geochemical character similar to S-type granite as follows: (1) high SiO₂ and K₂O, and low MgO, with K₂O/Na₂O values greater than 1.0; (2) peraluminous with A/CNK greater than 1.0; (3) slightly partition between LREE and HREE (La/Yb)_N=2.22~9.62, with negative Eu anomalies ranging from 0.27 to 0.81; (4) strongly depleted in Nb, Ta, Sr and Ti, and slightly depleted in Ba. On the basis of the age interval between granite and HP/UHP metamorphic event, in combination with the geochemical characteristic, the granite was suggested to derive from the partial melting of its country rock Al-rich gneiss with input of mantle material in post-collisional extension stage.

关键词: [构造热事件](#) [锆石U-Pb定年](#) [Hf同位素](#) [都兰](#) [柴北缘](#)

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主办单位: 中国矿物岩石地球化学学会

单位地址: 北京9825信箱/北京朝阳区北土城西路19号

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