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滁州火山岩地球化学及其对郯庐断裂带内岩石圈减薄的指示

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摘要:

位于郯庐断裂带张八岭隆起北段上的滁州早白垩世火山岩, 属于准铝质、硅过饱和岩石, 为一套中酸性的高钾钙碱性系列火山岩, 部分样品(129~125Ma)具有类似于埃达克岩的地球化学特征。该套火山岩富集大离子亲石元素和轻稀土元素、亏损重稀土元素及高场强元素, 并具有类似于EM I型的Sr-Nd-Pb同位素组成。地球化学特征显示该火山岩的岩浆源区属于华北克拉通, 早期火山岩(约132Ma)是富集地幔来源岩浆和古老的华北下地壳源区混合的结果; 中期和晚期火山岩(129~117Ma)是幔源底侵组分和古老的华北下地壳来源岩浆不同比例混合的产物。由早到晚, 滁州火山岩中古老壳源物质比例逐渐增加, 源区逐渐变浅, 指示软流圈顶面不断抬升、岩石圈内等温面逐渐升高的过程。研究表明, 热异常背景下强烈的壳-幔相互作用是该处断裂带内岩浆形成的主要方式, 其具体过程是在岩石圈底部持续减薄、软流圈上涌背景下, 幔源岩浆底侵而诱发了古老下地壳的部分熔融, 从而形成了壳-幔过渡带内混源的岩浆。郯庐断裂带内较浅的岩浆源区、较高的源区熔融程度、强烈而持久的伸展及岩浆活动、强烈的壳-幔相互作用以及现今较薄的岩石圈厚度, 都指示郯庐断裂带是华北克拉通东部岩石圈减薄中的强减薄带, 在华北克拉通破坏中起着重要的作用。

英文摘要:

The Early Cretaceous Chuzhou volcanic rocks from the northern segment of the Zhangbaling uplift along the Tan-Lu fault zone, are metaluminous and silicon-saturation, which belong to intermediate-acidic high-K cal-alkaline series, and some samples with eruption age > 125Ma resemble adakitic rocks in geochemical characteristics. These rocks are enriched in LILE and LREE, depleted in HREE and HFSE, and have an EM I-like Sr-Nd-Pb isotopic components. The geochemical data indicate a magma source of the NCC (North China Craton), and the earlier erupted magma (ca. 132Ma) has a mixed source of EM I enriched mantle and ancient lower crust, while the midst and later erupted magma has a mixed source of the mantle-derived underplated components, ancient lower crust of the NCC and little asthenosphere components in different proportions. From early to late, ancient crustal components in these volcanic rocks gradually increased, and magma source became shallower, which implied constantly uplifting of the asthenosphere surface and persistently ascending of isotherm plane within the lithosphere. These data support an interpretation that intensive crust-mantle interaction with a thermal abnormality was the major pattern of magma formation in this fault zone. Under the setting of continual thinning of lithosphere from its bottom and asthenosphere upwelling, the underplating of mantle-derived magma may trigger partial melting of the ancient crustal, and thus mixed magma may be formed in the crust-mantle transitional zone. Shallower magma source, higher melting extent, intensive and permanent magmatic and extensive activity, extensive crust-mantle interaction in Late Mesozoic and thinner lithosphere than inner craton nowadays within the Tan-Lu fault zone, all suggest that the Tan-Lu fault zone is an extensive lithosphere thinning zone in eastern NCC, and play an important role in the destruction of NCC.

关键词: [郯庐断裂带](#) [滁州火山岩](#) [岩石圈减薄](#) [底侵作用](#) [地球化学](#) [壳-幔相互作用](#)

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