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西准噶尔萨吾尔地区科克托别基性岩体岩石成因:地球化学和锆石U-Pb年代学证据

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摘要:

萨吾尔地区位于西准噶尔东北缘,广泛发育晚古生代中酸性侵入岩和火山岩以及少量基性侵入岩,这些岩浆岩的年代学研究对于限制西准噶尔地区石炭纪构造环境具有重要的意义。本文通过研究萨吾尔地区科克托别岩体的岩相学特征、锆石SHRIMP U-Pb年龄以及地球化学特征,探讨该岩体构造背景以及成因机制,为进一步论证西准噶尔地区石炭纪构造环境提供佐证。科克托别岩体包括中粗粒辉长岩、细粒辉长岩和闪长岩,在野外露头显示细粒辉长岩以脉状侵入中粗粒辉长岩中,细粒辉长岩中包裹有中粗粒辉长岩包体,中粗粒辉长岩与闪长岩之间呈渐变过渡接触关系,说明科克托别岩体是不同期次岩浆侵位形成的杂岩体,早期岩浆侵入形成中粗粒辉长岩和闪长岩,晚期岩浆上侵就位位于中粗粒辉长岩构造裂隙中形成细粒辉长岩。科克托别岩体中细粒辉长岩锆石SHRIMP U-Pb年龄为 323.2 ± 6.2 Ma,表明岩体形成于早石炭世晚期。该岩体成岩年龄晚于该地区蛇绿岩套岩石年龄,也晚于岛弧火山岩年龄以及含斑岩矿床侵入岩年龄,与该地区I型花岗岩年龄相似,而明显早于碰撞后A型花岗岩和双峰式火山岩的形成年龄,说明科克托别岩体可能形成于同碰撞构造环境中。不同岩相的岩石主量元素之间的相关关系以及微量元素配分型式相似性说明它们为同源岩浆结晶分异的产物。岩相学和地球化学特征表明岩体初始岩浆可能为软流圈地幔与上覆交代地幔相互作用形成,板片断离可能为软流圈地幔的上涌起到重要作用。

英文摘要:

The Sawuer region is located at the northeastern margin of the West Junggar, where the Late Paleozoic volcanic and intrusive rocks (including a few mafic intrusive rocks) are widespread. The geochronology of these magmatic rocks has great significance to constrain the Carboniferous tectonic setting in the West Junggar. This paper discusses the tectonic setting and the genetic mechanism of the Keketuobie intrusion in the Sawuer region and provides the evidence to constrain the Carboniferous tectonic setting in the West Junggar based on the petrography, SHRIMP U-Pb ages of zircons and geochemical compositions of different rock types from the Keketuobie intrusion. The Keketuobie intrusion is made up of medium-coarse grained gabbro, fine grained gabbro and diorite. The veined fine grained gabbro intruded in the medium-coarse grained one and some medium-coarse grained gabbro inclusions occurred in the veined fine grained gabbro. The contact between the medium-coarse grained gabbro and diorite is gradational. These petrographic characteristics indicate that the Keketuobie intrusion was formed from multiple pulses of magma. The early magma formed the medium-coarse grained gabbro and diorite, the later magma emplaced in tectonic fractures of the medium-coarse grained gabbro and formed veined fine grained one. According to SHRIMP U-Pb age analysis results, the crystallization of the fine grained gabbro is 323.2 ± 6.2 Ma, corresponding to late Early Carboniferous. The diagenetic age of the Keketuobie intrusion is older than those of ophiolite rocks, island arc volcanic rocks, the intrusive rocks in the porphyry deposits, coeval with the ages of the I-type granites, but clearly earlier than those of the post-collision A-type granites and bimodal volcanic rocks, suggesting the Keketuobie intrusion may be formed in the syn-collisional environment. The correlation of major oxides and the similar trace element partitions of the different rocks suggest that they are resulted from crystallization differentiation of the same primary magma. The petrographic and geochemical features suggest primary magma of the intrusion was produced by interactions between depleted asthenospheric melts and metasomatized lithospheric mantle. The slab break-off might play an important role in the upwelling of asthenospheric mantle.

关键词: [科克托别岩体](#) [辉长岩](#) [SHRIMP](#) [同碰撞](#) [西准噶尔](#)

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