1 Introduction

About Saima-Bailinchuan alkaline intrusion formation age, the chronology of early data were lack of accuracy. The Rb-Sr isochron age of complexes were 244±72Ma (Saima) and 218±39Ma(Bailinchuan), while the errors were large and difficult to limit the formation of the exact age(Zhou et al.,1996). The other Rb-Sr isochron age was 219Ma(Jing et al.,1995). Recently, Wu et al (2005) measured the age of the alkaline complexes, but they did not give specific petrology data. The author achieved another batch of alkaline complexes of U-Pb age, and obtained meaningful zircon trace elements data. We also have a new understanding about the nature of alkaline magma activity in the area.

2 Geological Setting

The Saima-Bailinchuan massif is located in Fengcheng city, Liaoning Province, at the western end of a sublatitudinal-trending alkaline rock terrain. The total outcropping area of the Saima-Bailinchuan alkaline intrusion terrain is about 280km². The massif is just situated at the northern margin of the North China Platform reactivated during Indosinian orogeny, at the deep-seated fault zone adjacent to the contact border between the old craton in the reactivated platform and the Proterozoic mobile zone(Fig.1). Main rock types are alkaline syenite and aegirine-nepheline syenite(Fig.2).

3 Chronology Study

All zircon grains have fine oscillatory zonings in CL images, which are columnar, short columnar, euhedral crystal, and more complete crystal edges and crystallographic plane(Fig.3). The ratios of length/wid-th in the most of zircons range from 1 to 2. It is consistent with the characteristics of alkaline magmatic zircons(Pan et al.,1994). In situ zircon U-Pb LA-ICP-MS dating on the five samples(SM-6, SM-7, BLC-1, BLC-2, BLC-3), in order, 231.9±3.7Ma(MSWD = 1.01), 227.6±6.4Ma (MSWD = 1.3), 235.7±4.7(MSWD = 4.3), 227.8±2.2 (MSWD = 3.5), 212.3±1.5 (MSWD=1.02) (Fig.4,5,6).

4 Zircon Geochemical Study

Zircon grains have rather low LREE/HREE(0.12~1.05) and steep HREE enrichment distribution model, with significant positive anomaly of δCe(1.15~101.67) and weakly negative anomaly of δEu(0.7~1.0) in four samples. The ratios of Th/U are relatively high, especially for the sample of BLC-3 zircon(1.17~2.93, with average of 1.79). The ratios of Nb/Ta are very high(3.21~28.60), which belong to the magmatic zircon. The ∑REE of Four samples (SM-6,SM-7,BLC-1,BLC2), in order, 51.60~8102.4 μg/g, 120.66~828.52 μg/g, 238.40~3280.79μg/g, 225.72~3275.3 μg/g (Fig.7).

5 Discussion

The ∑REE characteristics of zircon in aegirine-nepheline syenite were lower than syenite. These zircons are all of high REE content, HREE enrichment, LREE depletion and no obviously Eu anomaly, obviously positive Ce anomaly(δCe=1.15~101.67). Compared with zircon in syenite, Ce and Eu anomaly more prominent and obvious. While all the rare earth distribution patterns of samples have a high degree of similarity, it may indicate that the homology both Saima aegirine-nepheline syenite and Bailinchuan syenite in zircon. Researche show that source magmatic zircon ∑REE change range is wide, 250 ~5000ppm ,HREE enrichment and LREE loss. It has obviously positive Ce abnormal and Eu negative anomaly (Hoskin et al.,2000). While the mantle-derived magmatic zircon ∑REE is lower than it, which also enrichment of

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HREE, loss of LREE. It has obvious Ce abnormal, weakly Eu negative anomaly or not (Belousova et al., 2002). Saima-Bailinchuan zircon distribution patterns are similar to the characteristics of mantle-derived magmatic zircon. But compared with mantle-derived magmatic zircon ΣREE, there are the higher ΣREE in zircon. It may indicate that Saima-Bailinchuan alkaline intrusion source area give priority to with mantle source material, but it may mix some crust source material. So the genesis of Saima-Bailinchuan alkaline intrusion is the mixed-crust-and mantle-type, the latter is the major one. Wu et al. (2005) measured the age of alkaline intrusion were 233±1Ma (Saima) and 231±1Ma (Bailinchuan) by TIMS and LA-ICP-MS method. While author measured the age of sample (BLC-3) was 212.3±1.5Ma (MSWD = 1.01). So far, it was determined that the northern margin of north China craton alkaline magma activity time continued until 220Ma (Cai et al., 2011). But the zircon age of BLC-3 is 212.3±1.5Ma (MSWD=1.01), it may indicate that the alkaline magma activity is likely to continue until about 212 Ma in the region (Late Triassic Epoch).

6 Conclusion

These zircons are all of high REE content, HREE enrichment, LREE depletion and no obvious Eu anomaly.
obviously positive Ce anomaly. The genesis of Saima-Bailinchuan alkaline intrusion is the mixed crust and mantle-type, the latter is the major one. The zircon age of BLC-3 is 212.3±1.5Ma (MSWD=1.01) (23 measuring points), it may indicate that the area of alkaline magma activity is likely to continue until about 212Ma.

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References


