The North Qilian orogenic belt is an elongate, NW–SE trending belt. It is located in a joint region among the three major blocks in China, i.e., the North China Craton in the northeast, the Yangtze Craton in the southeast and the Tarim Craton in the northwest (Song et al., 2013). The Zhulongguan Group which is exposed in Longkong area is its lower part, with the gray green aleuropelitic slate and calcareous slate in the upside, the gray green tuffaceous slate which is the producing formation in the middle, and with the black slate, kiesel slate and silica rock in the downside. There is a great quantity of basalt in the north nearby the mineral occurrence. The basalt is very fresh, gray black and with intergranular and vitrophyric texture.

Longkong volcanic rock span a narrow range with SiO$_2$ 51.35–54.84 wt.%, FeO$_T$ 10.07–13.04 wt.%, MgO 4.44–5.84 wt.%, Al$_2$O$_3$ 14.75–16.59 wt.% and the Mg# value (Mg/(Mg+Fe))= 0.40–0.47. They show tholeiitic features in the Alkali-FeOt-MgO (AFM) diagram. The whole rare-earth element is varying from 48.58×10$^{-6}$ to 109.85×10$^{-6}$, and LREEs is fractionated obviously. Most samples show LREEs enrichment relative to HREEs (LREE/HREE=0.64–1.68).The internal fractionation in LREEs ((La/Sm)$_N$=1.22–1.79) is more seriously than the HREEs ((Gd/Yb)$_N$=1.07–1.18).Their chondrite-normalized REE patterns also display a weak Eu negative anomaly (Eu*=0.88–1.04). The primitive mantle normalized multi-element diagram display the big bulge, a more visible Nb-Ta trough and there is no negative anomaly of Ba, Sr.

The primitive mantle normalized multi-element diagram reveal that the volcanic rocks were formed in a continental-rift environment, and their source resembled an asthenospheric mantle which is similar patterns to the ocean-island basalt and was contaminated by geosphere during the upward migration and eruption of the magma. This study also has done some dating on Longkong volcanics. We have found the formation time is 766.7Ma which have not been published. Meanwhile we know that the formation time of the Chaidanuo granite which had intruded into the Zhulongguan Group volcanics is 508±4.6Ma. Combined with previous data, we suggest that the volcanics is related to the continental breakup of Rodinia happened in the Neoproterozoic and it is a part of the volcano-sedimentary rocks formed in that period. The North Qilian Ocean cracked in the Late Neoproterozoic, opened in Cambrian-Ordovician and then formed the oceanic crust. Many regions are recorded for this large-scale magma, ocean floor spreading and oceanic crust shaping (Xia et al., 2012).

Key words: Zhulongguan Group, geochemistry characteristics, North Qilian, continental-rift environment

References