

Volcanic geology, geochronology and geochemistry information provided by the Halaha River and Chaoer River volcanic field in Daxing'an Mountain Range

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34 Quaternary volcanoes, which scattered along a Quaternary NE strike fault, are found in the area of Halaha River and Chaoer River, middle of Daxing'an Mountain Range. Quaternary volcanic rocks in this area, mainly alkaline basalt, cover an area of ca. 400 km². Both magmatic eruptions and phreatomagmatic eruptions are found in this area. The magmatic eruptions form a series of products, including scoria cones, tephra fallout deposits, and many kinds of lava (e.g. aa lava, pahoehoe lava and block lava). Typical fumarolic cones and lava hillocks are found in the lava. The phreatomagmatic eruptions have typical base surge deposits, which are characterized by parallel bedding and staggered bedding. Volcanic activity in this area form many volcanogenic lakes. According to the difference of lake forming, they are divided into four types: crater lake, maar lake, volcanic dammed lake, collapse lava lake (Zhao et al., 2008).

Based on studies on the volcanic field characteristics, in conjunction with geological dating by K-Ar, it is identified that the volcanism occurred in four periods: Early Pleistocene, Middle Pleistocene, Late Pleistocene and Holocene. Basalts of Early Pleistocene, mostly mantled by the later volcanic rocks, are distributed in the margin and valleys of the volcanic field. Middle Pleistocene, the most volcanic active period in this area, witnessed the formation of more than half of Quaternary volcanoes and lava spreading. Moderate volcanism occurred in Late Pleistocene which produced a small amount of volcanic deposits. Volcanic activities are strengthened again in Holocene Period, characterized by strongly explosive explosion, widespread lava flow and well-keeping lava landforms features (Fan et al., 2011).

The volcanic rocks, dominated by alkali olivine basalts in sodium series, is characterized by relative enrichment in large ion lithophile elements and light rare earth elements. The fractionation of rare earth element of the basalts is weak($(La/Yb)_N = 8-12$). They resemble alkali basalts in Datong, as shown by trace elements distribution patterns, and generally exhibit OIB-like characteristics. The basalts show nearly homogeneous Sr-Nd-Pb isotopic composition similar to MORB source and present depleted mantle characteristics. All data show that basalts of HC have a garnet lherzolite mantle source, low degree partial melting(8%-15%)in which results in the primitive magma. Crystal fractionation of olivine and pyroxene from the magma is weak and seldom contamination by the crust rocks happens during the magma ascending, which resulting the volcanic rocks with high MgO content(>9wt%), Ni content and Mg value(60-70).Regional extension triggers asthenospheric upwelling, which may lead to the genesis of magma and subsequent volcanism (Zhao and Fan, 2012).

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