YANG Shuyan, PENG Peng, Qin Zhaoyuan, WANG Xinping, WANG Chong, 2016. Genetic Relationship of the 1780-1760 Ma Dykes and the Coeval Volcanics in the Lvliang Area, North China. *Acta Geologica Sinica* (English Edition), 90(supp. 1): 133-134.

Genetic Relationship of the 1780-1760 Ma Dykes and the Coeval Volcanics in the Lvliang Area, North China

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The 1780-1760 Ma Taihang dyke swarm and the coeval Xiong'er volcanic province are the most widespread magmatic events occurring post the amalgamation of the two North China cratons. It has been debated whether these volcanics and dykes with variant compositions were originated from distinct sources or from one source differentiated by magmatic processes . Some suggest that they comprise a bimodal volcanism; whereas some others think the high silicic components were from crust but the mafic rocks were from mantle. Recently, Peng et al. (2015a) proposed that they were from a same source with their compositional variations originated from fractional crystalization and large-scale immiscibility. In the Lvliang area, the 1780–1760 Ma Taihang dykes and the Xiaoliangling Formation volcanics, part of the Xiong'er volcanic province, are both developed. In this study, zircon/baddeleyite ages, bulk compositions, as well as the petrographic characteristics of different types of rocks are compared to reveal their genetic relationship.

In the Lvliang area, the 1780-1760 Ma Taihang dykes have two-prevalent orientations, one is EW-oriented and dominated by acidic dykes (low-Ti but high-Si dykes: TiO_2＜2.1 wt.% and SiO_2＞63 wt.%, simplified as HS dykes) while the other is NNW-oriented and dominated by mafic to intermediate dykes (low-Ti and low-Si dykes: TiO_2＜2.1 wt.% and SiO_2＜63 wt.%, simplified as LT dykes); yet we do not identify the so-called high-Ti dykes (HT dykes: TiO_2 ＜2.1 wt.% and SiO_2 ＜63 wt.%) as those from the Taihang Mts. (Peng et al., 2015a). The Xiaoliangling Formation volcanics is dominated by rhyolite to dacite volcanics (RD volcanics), with a few clastic interlayers and basalt to andesite volcanics (BA volcanics).

SIMS U-Pb dating on zircon from one ~22 m thick HS dyke near Tadigou village yields a weighted mean $^{207}Pb/^{206}Pb$ age of 1783 ± 7 Ma (n=12, MSWD=1.2), representing the timing of crystallization. SIMS U-Pb dating on zircon from a rhyolite layer near Yatou village yields a similar weighted mean $^{207}Pb/^{206}Pb$ age of 1776 ± 6 Ma (n=20, MSWD=0.58). They both are in accordance with the baddeleyite age of ~1780 Ma from a LT Xiaolouze dyke near Loufan village (Peng et al., 2015b). These ages indicate that the four groups (LT and HS dykes, BA and RD volcanics) were formed within limited time range (1780–1760 Ma). Furthermore, they are all tholeiitic in composition typically with 51–74 wt.% SiO_2 and 0.34–6.13 wt.% MgO, and all show slightly light rare earth element enrichments (La/Yb_N=7.88–20.23), negative Eu anomalies (Eu/Eu*=0.27–0.87), and negative anomalies in Nb and Ta and in Sr compared with the neighbouring elements in spidergrams. All the four groups share similar rare earth element and trace element patterns, though apparently, the rocks with higher SiO2 contents generally have higher total trace element compositions. Specifically, the LT dykes and BA volcanics, and the HS dykes and RD volcanics share exactly same composition ranges, respectively. Additionally, the RD volcanics contain thin volcanic layers (~20-30 centimeters) with Ti-Fe rich bubles (several millimetres to centimeters) varying in shape from rounded to elongated, aggregating at the bottom of the layer (Peng et al., 2015a). This immiscible structure implies that they are probably a component after the segregation of a high-Ti-Fe immiscible component. These geochemical similarities, as well as their spatio-temporal affinities and the geological facts, suggest that the dykes are conduits for the volcanics: the LT dykes as conduits for the BA volcanics, while the HS dykes as conduits for the RD volcanics. In addition, the LT and BA groups are compositionally different from those produced by immiscibiliby; whereas the HS and RD groups are similar to experimental rhyolite produced by an immiscible process (cf. Chalier et al., 2013). Thus these two 'bimodal' compositions are not potentially immiscible

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pairs. Combined with the immiscible textures in the RD rocks, we suggest that the LT dykes and BA volcanics are parent magma before the segregation of the two immiscible pairs; whereas the HS dykes and RD volcanics are the same immiscible component after the removal of high-Ti-Fe dykes (HT dykes).

References:

Charlier, B., Namur, O., Grove, T.L., 2013. Compositional and kinetic controls on liquid immiscibility in ferrobasalt-rhyolite volcanic and plutonic series. *Geochimica et Cosmochimica Acta*, 113, 79–93.

Peng, P., Wang, X., Lai, Y., Wang, C., Windley, B.F., 2015a. Large-scale liquid immiscibility and fractional crystallization in the 1780 Ma Taihang dyke swarm: Implications for genesis of the bimodal Xiong'er volcanic province. *Lithos*, 236, 106–122.

Peng, P., 2015b. Precambrian mafic dyke swarms in the North China Craton and their geological implications. *Science China Earth Sciences*, 58, 649–675.