Cenozoic Bimodal Volcanic Rocks of the Northeast boundary of Tibet Plateau: implication for the collision-deduced mantle flow in Tibetan Plateau and the rifting genesis of North-south tectonic belt

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Cenozoic bimodal volcanic rocks of the Northeastern boundary of Tibet Plateau located in the area of West Qinling, Gansu Province in China, which belong to the west boundary of Ordos block and also north section of North-South tectonic belt in tectonics. The longitude is E104°30'-105°36' and the latitude is N33°35'-34°40'in geography. The bimodal volcanic rocks like to East Africa rift, consisted of kamafugite, carbonatite, Shoshonite, rhyolite and/or trachyte. The age of the bimodal volcanic rocks is between 23Ma to 7.1Ma determined by isotopic dating of K/Ar and $^{39}Ar/^{40}Ar$. The $^{87}Sr/^{86}Sr$ = 0.704031-0.70525, $^{206}Pb/^{204}Pb$ = 18.408-19.062, $^{207}Pb/^{204}Pb$ = 15.476-15.677, $^{208}Pb/^{204}Pb$ = 38.061-39.414 and εNd = 0.3-5.3 of the volcanic rocks, all of these are similar to the feature of Neo-Tethyan mantle geochemical end member represented by Yaluzangbu ophiolites, and also to the volcanic rocks related to Onto Java and FOZO mantle plume (Yu et al., 2009, 2011). It showed the Cenozoic bimodal volcanic rocks have the geochemical feature of Indian Ocean mantle geochemical domain. and the genesis of the bimodal volcanic rocks may be related to mantle plum, the magmatic resources of the volcanic rocks should be a depleted mantle.For this reason, we guess the origin and genesis of Cenozoic bimodal volcanic rocks related to northeastward migration and upwelling of the collision-deduced mantle flow along the interface of 400 km depth beneath the Tibetan plateau, and also responses to eastward expanding of the Tibetan plateau.

Cenozoic bimodal volcanic rocks in Western Qinling providing ideal lithoprobes for understanding North-south tectonic belt and proved North-south tectonic belt is a rift However, we should take notice of the West Qinling has been located compression geobackground coming from North Asia continent, West Pacific tectonic domain and Southwest Tethyan domain since Mesozoic to Cenozoic(Zhang et al., 2006). The crustal thickness is 52Km and the deep of the lithopheric bottom is >120Km in West Qinling revealed by geophysics (Lin et al., 1995). The geothermal of West Qinling is higher than that of Huabei Craton and near to oceanic geothermal line determined by mantle xenoliths bearing on the kamafugite (Shi et al., 2003). Therefore, West Qinling is not a typic Craton and is a Cratonic blocks composed of many litter of blocks linked by oroginic belts (Deng et al., 1996). Among of the blocks have been seprated by East Kunlun faults and Nouth boundary fault systems of West Qinling with complex structure. For these reason mentioned above, we guess the rifting of North-south tectonic belt is not similar to Baikal rift, and is also not like East Africal rift formed in typic Craton. The feature and genesis of the rift of North-south tectonic belt not only controlled by northeastward migration and upwelling of the asthenosphere flow along the interface of 400 km depth beneath the Tibetan plateau, but also related to the differences of move velocity and direction between the blocks, and to the stress differences of compression, strike-slip, shear and stretch of the blocks and faults. So the North-south tectonic belt is an active tectonic belt and is a developing boundary of plates.