

# The volcanic rocks of the Bogda Rift, China: a possibly new genetic type of bimodal suite

YIN-XI WANG<sup>1,2</sup>, LIAN-XING GU<sup>2</sup>, ZUN-ZHONG ZHANG<sup>2</sup> AND HUI-MING LI<sup>1</sup>

<sup>1</sup>Center of Modern Analysis Nanjing University, Nanjing 210093, P.R. China(yxwang@nju.edu.cn)

<sup>2</sup>State Key Laboratory of Mineral Deposit Research, Nanjing University, Nanjing 210093, P.R. China

The Bogda Mountain is part of the eastern Tianshan mountain range of NW China. The Bogda orogen has been proved to be a Early to Middle Carboniferous continental rift by many lines of geological and geochemical evidence. With total thickness of over 700 m, volcanic rocks of the Lower Carboniferous Qijiaojing formation are characterized by rhythmic interbedding of basaltic and rhyolitic lavas at a basalt/rhyolite ratio of 7/1. Some of the basalt layers show pillow structure. With a gap between 55% and 64%, SiO<sub>2</sub> content indicates a bimodal nature of these volcanic rocks.

Rb-Sr isochron ages of the basalt and rhyolite are  $342.0 \pm 3.2$  Ma and  $340.3 \pm 3.4$  Ma, respectively, and are consistent with those indicated by fossils. These rocks were formed during strong extension of the rift. Basalt of the Qijiaojing formation is characterised by  $\epsilon_{Nd(t)} = +6.4 \sim +6.7$ ,  $(^{87}Sr/^{86}Sr)_i = 0.703261 \sim 0.703328$ ,  $(^{206}Pb/^{204}Pb)_i = 17.703 \sim 17.989$ ,  $(^{207}Pb/^{204}Pb)_i = 15.407 \sim 15.498$  and  $(^{208}Pb/^{204}Pb)_i = 37.147 \sim 37.825$ , while rhyolite of this formation is characterised by  $\epsilon_{Nd(t)} = +6.4 \sim +6.6$ ,  $(^{87}Sr/^{86}Sr)_i = 0.703368 \sim 0.703469$ ,  $(^{206}Pb/^{204}Pb)_i = 17.827 \sim 18.114$ ,  $(^{207}Pb/^{204}Pb)_i = 15.460 \sim 15.517$ , and  $(^{208}Pb/^{204}Pb)_i = 37.077 \sim 37.973$ . These data indicate that the rhyolite is similar in Nd-Sr-Pb isotopes to the basalt and that the basalt was derived from a depleted mantle, while the associated rhyolite was formed by fractional crystallization of the basaltic magma.

It is a common idea that fractional crystallisation can only produce a continuously differentiated rock series. However, bimodal volcanic rocks have been formed by the fractional crystallisation in the some case (1,2,3). Bimodal volcanic rocks, in which rhyolite is formed by fractional crystallisation of basalt are not rare on earth, but have not been reported from continental rift environments. Therefore, the bimodal volcanic rocks of th Bogda rift are likely to represent a new genetic type of bimodal suite.

## References

- (1) Geist D., Howard K.A. and Larson P. 1995. J. Petrol., **36**, 965-982
- (2) Hochstaedter A.G., Gill J.B. and Morris J. 1990. Earth Planet. Sci. Lett., **100**, 195-209
- (3) Brouxel M.,Lapierre H.,Michard A.and Albrede F. 1987. Earth Planet.Sci.Lett.,**85**, 386-400