

Mesozoic bimodal volcanics in SE China: implications for both upwelling of asthenosphere and mantle-crust interactions

JIN-CHENG ZHOU AND SHAO-YONG JIANG

State Key Laboratory for Mineral Deposits Research and
Department of Earth Sciences, Nanjing University, Nanjing
210093, China;
j.c.zhou@public1.ptt.js.cn and shyjiang@public1.ptt.js.cn

A typical feature of Mesozoic volcanic rocks in southeastern China is that a small amount of basalts are associated with contemporaneous rhyolitic rocks to form bimodal volcanics. There were two major episodes of the bimodal volcanism in SE China, early Cretaceous and early-middle Jurassic. The early Cretaceous basalts like “arc basalts” and have the continental crust-like Sr-Nd-Pb isotopic features. However, the basalts have γ_{Os} (130 Ma) values from 21.4 to 267.8, with ($^{187}Os / ^{188}Os$)_i ratios of 0.1531–0.4639. The early Cretaceous basaltic magmas might be derived from depleted rather than enriched lithospheric mantle source, and might have been contaminated by crustal rocks and melts during the ascent of basaltic magmas. The middle Jurassic basalts and rhyolites are distributed in the eastern Nanling area of southern China. The basalts show OIB signatures. The ϵ_{Nd} (T) values of most basalt samples are between -0.7 and 0.24 and are near chondritic. An initial $^{187}Os / ^{188}Os$ ratio of the Re-Os isochron of Fe-Ti oxide concentrates (magnetite-rich separates) from the Fankeng basalts in Fujian of SE China is 0.124 ± 0.014 at 175.4 Ma, which is close to that of chondrite (0.1258) at the time. The corresponding γ_{Os} (T) value calculated using the initial $^{187}Os / ^{188}Os$ ratio is -1.44 and essentially chondritic (Zhou et al., 2005). These basaltic magmas might be derived from asthenospheric mantle. Occurrence of middle Jurassic basalts in the area may be considered as a petrological mark of upwelling of asthenospheric mantle. The near chondritic ϵ_{Nd} (T) and γ_{Os} (T) for these basalts likely reflect the interactions between the depleted asthenospheric and the incorporated lithospheric mantles at the time. The mixing between the depleted mantle and the enriched lithospheric mantle caused the mantle source to have near-chondritic Sm-Nd and Re-Os isotopes signatures. The both early Cretaceous and middle rhyolitic rocks associated with the basalts show some characters of both I- and S-type granites in SE China and are considered to be the products of the interactions between mantle-derived magma and crust.

References

Zhou J.C., Jianag S.Y., Wang X.L., Yang J.H. and Zhang M.Q. (2005). *Geochemical Journal* **39**,497-502.