

## **Geochemical constraints on the nature of magma sources for Mesozoic bimodal volcanic rocks from the Middle-Lower Yangtze Valley in South China**

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The origin of bimodal (mafic–felsic) rock suites is a fundamental question in igneous petrology. However, the bimodal compositions makes the nature of their magma sources and their petrological relationship enigmatic. This paper presents a combined study of zircon U-Pb ages, Hf-O isotopes, whole-rock major-trace elements and Sr-Nd-Hf isotopes, and phenocryst major elements for Mesozoic bimodal volcanics from South China. Zircon U-Pb dating indicates that the bimodal volcanism occurred at ca.125-128 Ma. Geochemically, the mafic lavas are characterized by: (1) arc-like trace element distribution patterns; (2) moderately whole-rock Sr-Nd-Hf isotope compositions with ( $^{87}\text{Sr}/^{86}\text{Sr}$ )<sub>i</sub> ratios around 0.7066,  $\epsilon_{\text{Nd}}(t)$  values of -5.47 to -5.30 and  $\epsilon_{\text{Hf}}(t)$  values of -3.01 to -2.73; (3) highly variable zircon  $\epsilon_{\text{Hf}}(t)$  values of -20.5 to 7.9. An integrated interpretation of these observations suggests that the mafic rocks were originated from enriched mantle sources. In contrast, the felsic lavas show systematically more enriched whole-rock Sr-Nd-Hf isotope compositions than the mafic lavas. They have similar zircon  $\epsilon_{\text{Hf}}(t)$  values to the mafic rocks and variably high zircon  $\delta^{18}\text{O}$  values of 6.3 to 9.2‰. Together with their peraluminous lithochemistry, the felsic rocks were interpreted to be originated from the terrigenous metasediment. The similarity in zircon  $\epsilon_{\text{Hf}}(t)$  values between the mafic and felsic volcanics suggests that the metasediment would have served as a common component in their magma sources. As such, the mantle sources of mafic volcanics were generated by reaction of the mantle wedge peridotite with aqueous solutions and hydrous felsic melts. Such mantle sources then underwent partial melting at ca.125-128 Ma. At the same time, the felsic volcanism is produced by partial melting of the metasediment. Therefore, the magma sources of both mafic and felsic volcanics were located in the fossil oceanic subduction channel in the lithospheric mantle, sharing the same metasedimentary component.