A unified model for the Mesozoic and Cenozoic basalts, East China

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The East China is a representative place where mafic lower continental crust recycled into the convecting mantle during the Mesozoic lithospheric thinning. Partial melting of recycled eclogitic rocks prior to peridotite[1] would result in the following mixing: (1) dynamic mixing of peridotite and silicate melts by infiltration, (2) static mixing of peridotite and silicate melt by injection, and (3) simple mixing of peridotite and eclogitic residue after silicate melt extraction.

Although Nd and Sr isotopes suggest EMI and/or EMII components for the Mesozoic and Cenozoic basalts from the East China, the Mesozoic basalts are characterized by island arc-type trace element patterns, whereas the Cenozoic ones are characterized by OIB-type features, and to some extent, is compensatory to the Mesozoic ones (Fig. 1). On the other hand, the Cenozoic basalts are characterized by high Fe/Mn (67.9) and low Nb/Ta ratios (15.0) and high Nb and Ta contents (62.1ppm and 4.22ppm), implying rutile-bearing cpx/gt-rich mantle sources according to $Kd_{Fe/Mn}$(cpx, opx, gt and ol)[1-5] and $Kd_{Nb/Ta}$(rutile)[6] values. On the contrary, less high Fe/Mn (59.2) and very high Nb/Ta ratios (19.1) and low Nb and Ta contents (11.5 ppm and 0.67 ppm) of the Mesozoic basalts suggest opx-rich mantle sources metasomatized by silicate melts in equilibrium with rutile-bearing eclogitic residue.

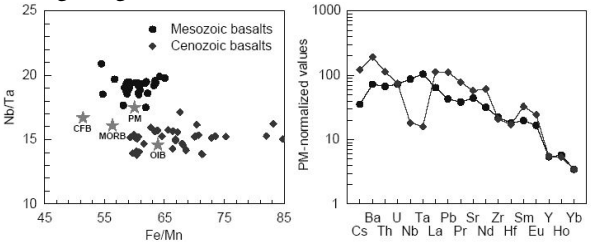

Fig. 1 Plots of Nb/Ta vs. Fe/Mn and Primitive mantle (PM)-normalized values for the Mesozoic and Cenozoic basalts

Combining with Nd-Sr isotopes, we suggest that the Mesozoic basalts derived from pyroxenite-veined peridotite formed by dynamic mixing of peridotite and Rutile-bearing Eclogite-derived Silicate Melts (RESM) by infiltration, and the Cenozoic basalts from mixture of peridotite and rutile-bearing eclogitic residue after RESM extraction.

References

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