

Highly differentiated granites from the Sanyo Belt of Japan: REE tetrad effect and Nd isotope evidence for Precambrian source rocks

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Cretaceous granites (ca. 70 Ma) from the Sanyo Belt, Japan (Tanakami, Sosha, Kurashiki, Naegi and Okayama) were analyzed to show that the REE tetrad effect is probably a common feature in highly differentiated granitic rocks. The analyzed rocks are very siliceous with SiO₂ ranging from 72-82%, and show trace element characteristics commonly observed in granites with lanthanide tetrad effect. Regarding their Sr-Nd isotopic compositions, their high ⁸⁷Rb/⁸⁶Sr ratios prevent precise determination of initial Sr isotope compositions. The REE tetrad effect produced variable but high ¹⁴⁷Sm/¹⁴⁴Nd ratios (0.13-0.23) in comparison with normal granites (ca. 0.12). Combination of these ratios with negative ε_{Nd}(0) values (-4 to -12) yielded aberrant single-stage T_{DM} model ages. Two-stage model ages (1220-1800 Ma) and initial ε_{Nd}(T) values of -4 to -11 will be used in petrogenetic discussion and tectonic implications.

The formation of the Japanese Islands has been taken as a model for the accretionary orogeny and may help our understanding of the evolution of the Central Asian Orogenic Belt. According to Maruyama [1], the most important cause of the orogeny is the subduction of oceanic ridge, by which the continental mass increases through the transfer of granitic melt from the subducting oceanic crust to an orogenic belt. In this scenario, granitic melts would be quite juvenile as observed in most parts of Central Asia. However, the Mesoproterozoic Sm-Nd model ages and negative ε_{Nd}(T) values require that crustal rocks older than the model ages be present in the generation of these granitic melts. A critical question remains: where is the Precambrian crust located and what is its occurrence? (NSC grant 94-2116-M-001-021).

[1] Maruyama, S. (1997) *The Island Arc*, 6, 91-120.