Regional Pb-Nd-Sr isotopic differences of the Mesozoic granitoids in South Korea: Implications for the basement structure

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The isotopic ratios of granitoids can provide important information about the nature of the lower crust, since granitoid magmas are generally formed by the partial melting of the lower crust rocks. The initial isotopic ratios of Pb, Nd and Sr of this and previous studies for the Mesozoic granitoids from widely separated parts of South Korea show regional differences regardless of their intrusion ages. The isotopic differences are most prominent between the granitoids in the Gyeongsang basin and those in other tectonic provinces (the Gyeonggi massif, the Okcheon belt and the Yeongnam massif). The former has mantle-like signatures: $^{87}Sr/^{86}Sr$ = 0.705 to 0.707, _Nd(T) = -6.6 to +3.9, $^{206}Pb/^{204}Pb$ = 18.2 to 18.4, $^{207}Pb/^{204}Pb$ = 15.53 to 15.59, $^{208}Pb/^{204}Pb$ = 38.1 to 38.5, whereas the latter has old crust-like signatures: $^{87}Sr/^{86}Sr$ = 0.709 to 0.717, _Nd(T) = -8 to -21, $^{206}Pb/^{204}Pb$ = 16.9 to 18.8, $^{207}Pb/^{204}Pb$= 15.49 to 15.81, $^{208}Pb/^{204}Pb$ = 37.6 to 39.8. In detail, those granitoids with the crustal isotopic signatures can be further divided into five regional zones: Northeast, Southwest, Central, West and Southeast. The first two zones have most enriched signatures, and the last two zones have least enriched signatures. The Central zone has intermediate signatures. These isotopic zones appear to have no direct geographic relationships with the NE-trending tectonic provinces, and are considered to reflect the basement differences. We also note that the regional differences in the gravity anomaly of South Korea more or less agree with the regional isotopic differences. Namely, the zones with the most and least enriched isotopic signatures have strong negative and positive Bouguer anomalies, respectively, suggesting that the crustal thickness of South Korea may correlate with crustal formation age. We present a model for the basement structure of South Korea on the basis of the above observations.