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Constrasting isotopic and geochemical compositions of the ultramafic xenoliths and their role as a source of associated Cenozoic alkali basalts of Korea

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A characterization of isotopic and geochemical compositions of the lithosphere in the Korean peninsula is important for understanding not only the evolution of the subcontinental lithospheric mantle itself but also the genesis of widespread Cenozoic basalts of the area. The Sr and Nd rediogenic isotope compositions of the spinel peridotite xenoliths from Korean peninsula can be divided into two groups; one group with enriched isotopic compositions very similar to their host basalts and the other group with quite depleted compositions to the extent similar to very depleted mid-oceanic ridge basalts. Such contrast between two groups is also correlated with differences in their mineralogical and major element compositions. The isotopically enriched group shows refractory major element compositions with quite low CaO and Al2O3 contents indicating their derivation from the old Paleoproterozoic subcontinental lithospheric mantle beneath the Korean peninsula. In contrast, the isotopically depleted group shows fertile compositions with relatively high CaO and Al2O3 contents similar to asthenospheric mantle that may have been newly incorporated into the lithosphere recently. The ultramafic xenoliths of both groups reveal their derivation from relatively shallow depths of <75 km coincident with generally proposed lithospheric thinning of the Archean to Paleoproterozoic Sino-Korean Craton. The isotopic similarity between the enriched xenoliths and host basalts seems to indicate a genesis of such basaltic melts from the lithospheric mantle previously detached during the Cenozoic extrusion and widely dispersed beneath the Sino-Korean Craton.