Geochemistry of Precambrian Granite from Taebaek area, northeastern part of South Korea

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Nonggeori granite and Naedeokri granite are known as early to middle Proterozoic plutons in the northeastern margin of the Ryongnam massif in South Korea. They occur as stocks intruding Precambrian metasediments at Taebaek area in Gangwon Province, which is located in NE part of South Korea. Pegmatites occur at adjoining areas either near or between Nonggeori and Naedeokri granites. In this report, we discuss the genetic relationship among granites with the geochemical characteristics such as major components, rare earth element (REE), and Nd, Sr isotopic systems. We think that this result play an important role in understanding Precambrian orogenic activity in Korean Peninsula and Sino-Korean Craton.

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Total REE abundance of Nonggeori granite is higher than that of Naedeokri granite. On the contrary, pegmatites show very low REE content. In the chondrite-normalized patterns, the Nonggeori and Naedeokri granites have characteristics of LREE-enriched, HREE-depleted patterns and highly negative Eu anomalies. But REE patterns of pegmatite are divided into three types, which are flattened type with highly negative Eu anomalies, LREE depleted type with slightly negative Eu anomalies and LREE enriched type with Eu positive anomalies. Especially, they show "tetrad effect" of M and W type slightly, which are characteristics of the reaction result between fluid-rich and fluid-poor magma. Such characteristics of REE patterns from pegmatite suggest that pegmatite was fractionated from neighboring granites. And, on the basis of such systematic chondrite-normalized REE patterns and similar chemical composition from granites, we assumed that the magma sources of Nonggeori, Naedeokri granites and pegmatite were co-genetic or fractionated from magma having similar chemical composition. Especially, in order to compare the difference of formation age between Nonggeori, Naedeokri and pegmatite, we calculated the ages of Nonggeori and Naedeokri with the isotopic data point of pegmatite, respectively. As a result, we obtained 1.86+/-0.16 Ga and 1.73+/-0.32 Ga of Sm-Nd and Rb-Sr ages from Naedeokri granite, respectively, and also 1.85+/-0.28 Ga of Sm-Nd age from Nonggeori granite. Such ages suggest that Nongeori and Naedeokri granites were derived from magma having very similar geochemical characteristics. And, on the basis of such characteristics for the isotopic data and chemical compositions, we recalculated the Sm-Nd and Rb-Sr ages including three granites. As a result, we obtained ca. 1.81+/-0.12(2sigma) Ga of Rb-Sr age with 0.7117+/-0.0397 of initial 87Sr/86Sr and ca. 1.83+/-0.24(2sigma) Ga of Sm-Nd age with 0.50989+/-0.00107 of initial 143Nd/144Nd. These ages show good correspondence with the previous age data by K-Ar, Rb-Sr, Pb-Pb systematics.

In conclusion, our data for the chemical composition of major element, chondrite-normalized REE pattern, and initial Nd isotopic ratio from Nonggeori, Naedeokri granites and neighboring pegmatites suggest the possibility that they may be fractionated from co-genetic magma having very similar/or the same geochemical composition.