

Petrogenesis and tectonic significance of the Paleoproterozoic orthogneiss in the Yeongnam Massif, South Korea

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The Yeongnam Massif consists of a basement of the Korean Peninsula with the Nangrim and Gyeonggi Massifs and has undergone various geological events from the Precambrian to Phanerozoic. The study area (Jangsu-Janggye area) is located in central part of the Yeongnam Massif and is mainly composed of the Paleoproterozoic orthogneisses (granite-granodiorite) with metapelite and calcisilicate rock. Zircon age dating reveals that the protoliths of the orthogneisses emplaced ca. 2.00-1.96 Ga and were metamorphosed ca. 1.89-1.87 Ga. The geochemical (e.g. enrichment of LREE, negative Nb, Ta and Ti anomaly) and zircon Hf isotopic ($\epsilon\text{Hf}(t) = -1.63$ to -6.41 ; $T_{\text{DM2}} = 3254$ Ma) data suggested that the protoliths of the orthogneisses in the study area were formed by partial melting of the Archean crustal materials that have metagraywacke and metabasite compositions in an arc-related setting. This geochronological and geochemical data well correlate to the Paleoproterozoic orthogneisses distributed in the central to northeastern Yeongnam Massif. It may indicate that there were regional Paleoproterozoic subduction zones along the northern margin of the Yeongnam Massif during ca. 2.00-1.96 Ga. Meanwhile, this Paleoproterozoic arc-related magmatic event has not been identified from the Gyeonggi and Nangrim Massifs in the Korean Peninsula. It may imply that the Yeongnam Massif may undergo different tectonic evolution compared to the Gyeonggi and Nangrim Massifs during Paleoproterozoic and may have existed as a separated block.