Paleoproterozoic (ca. 2.0-1.97 Ga) arc-realated magmatism in the Muju area, Yeongnam Massif, South Korea and its tectonic implication to Northeast Asia

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The Muju area, located on the north–central Yeongnam Massif, is composed of Paleoproterozoic metaigneous rocks (granitic, leucogranitic and dioritic gneisses). Zircon U–Pb dating reveals that the protoliths of the metaigneous rocks emplaced at ca. 2.00–1.97 Ga and were metamorphosed at ca. 1.87–1.86 Ga. Magmatic zircons in the metaigneous rocks have positive to negative εHf(t) values (– 7.63 to + 3.3) and a Neoarchean two-stage model age (T_{DM2} = 2.78 Ga). It indicates that the protoliths of metaigneous rocks in the Muju area may have been originated from Archean crustal material. The results of geochemical analysis reveals that the protoliths of the metaigneous rocks formed by partial melting of metagraywacke and metabasite in a subduction-related setting. The geochronological and geochemical data obtained from the Paleoproterozoic metaigneous rocks correlate well with those of Paleoproterozoic (ca. 2.00–1.97 Ga) metagranitoids in the northeastern Yeongnam Massif. It may implies the presence of Paleoproterozoic (ca. 2.00-1.97 Ga) subduction zones along the northern margin of the Yeongnam Massif. On the contrast, the ca. 2.00–1.97 Ga subduction-related magmatism has not been reported from the northern Gyeonggi and Nangrim Massifs in the Korean Peninsula and the Jiao–Liao–Ji belt in the eastern North China Craton, indicating that the Yeongnam Massif may not be a part of North China Craton.