

Zircon U–Pb geochronology and P–T estimation of gneisses and amphibolites from the southwestern Gyeonggi Massif, South Korea: Implication for regional middle Paleozoic metamorphism

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The Hongseong area, characterized by the Permo–Triassic eclogite and high-grade rocks, in the southwestern Gyeonggi Massif, South Korea, is considered as a part of eastern extension of the Dabie–Sulu collision belt in China (e.g., Oh and Kusky, 2007). Recently, middle Paleozoic igneous and metamorphic events are also known in this area (Oh et al., 2009, 2014; Kim et al., 2008, 2014; Kwon et al., 2014). However, it is still questionable 1) whether middle Paleozoic events regionally occurred or not and 2) what kind of metamorphism occur in the southwestern Gyeonggi massif. We carried out zircon U–Pb SHRIMP ages and P–T estimation of gneisses and amphibolites in this area to constrain multiple protolith ages and metamorphic events. Migmatitic biotite gneisses in eastern Wolhyeonri complex formed during Neoproterozoic and underwent the granulite facies metamorphism (750–880 °C, 12–15 kbar) at 442–413 Ma and subsequent amphibolite facies retrograde metamorphism at 585–660 °C and 7.5–10.3 kbar. Mylonitic biotite gneiss, hornblende gneiss, and folded amphibolite also yield the metamorphic ages ranging between 429 and 420 Ma. The protoliths of several garnet amphibolites formed at 470–456 Ma due to arc magmatism, and they were also metamorphosed before 418 Ma by high pressure amphibolite facies metamorphism at ca. 625–700 °C and 13–15.5 kbar, followed by retrograde amphibolite facies metamorphism at ca. 625–700 °C and 8–9 kbar at 418–405 Ma. The SHRIMP ages obtained from a various rock type indicate that the middle Paleozoic metamorphism regionally occurred in this area. In contrast, the Paleoproterozoic augen gneisses block in the Deokjeongri gneiss complex preserve high pressure metamorphism (840–960 °C, 17–21.8 kbar) at 234–230 Ma as eclogite previously reported in this area. Regional middle Paleozoic metamorphism before high pressure Permo-Triassic metamorphism could be comparable with the middle Paleozoic Qinling orogeny in China, which were caused by the microcontinental collision before the Permo-Triassic collision between the North and South China Cratons.

Keywords: southwestern Gyeonggi Massif, zircon U–Pb ages, middle Paleozoic metamorphism