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Zircon U-Pb ages, Hf isotopes and geochemistry of the Precambrian gneisses in the Wonju-Jechon area, Southern margin of the Gyeonggi Massif: implications for the Precambrian tectonic evolution of the Gyeonggi Massif and Northeast Asia

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The basement of the Korean Peninsula consists of three Precambrian basements, which from north south are the Nangrim, Gyeonggi and Youngnam Massif. Because of the similar tectonic evolution between Gyeonggi Massif and North China Craton, the understanding on the Precambrian tectonic evolution of the Gyeonggi Massif in South Korea is important when interpreting the tectonic evolution of Korea and northeast Asia, and the geologic relationships between Korean and China. The Wonju-Jechon area is located at the southeastern part of the Gyeonggi Massif and consists mainly of the Precambrian gneisses. In the Wonju-Jechon area, the intrusion of the protolith of migmatite and granitic gneiss occurred in the collision and/or post collision tectonic setting at ca. 2.5 Ga, followed by intrusion of the two-mica granitic gneiss that formed in the arc-related tectonic setting at 1.94–1.91 Ga. Associated with intrusion of the two-mica granitic gneisses, the migmatites and granitic gneisses underwent a first stage metamorphism at 1.94–1.90 Ga. The protolith of porphyritic gneisses then intruded into these migmatite, granitic and two-mica granitic gneisses in the post-collisional tectonic setting at ca. 1.80 Ga. Finally, the Precambrian gneisses underwent a second stage of regional metamorphism during the early Permian (ca. 285 Ma). The values of $\varepsilon_{Hf}^{(t)}$ and model ages (T_{DM2}) of zircons in the Precambrian rocks of the Wonju-Jechon area indicate two crustal-growth (ca. 3.3 Ga and 2.5 Ga) and three periods of reworking (ca. 2.5 Ga, ca. 1.9 Ga and ca. 1.8 Ga); the two-mica granitic and porphyritic gneisses were formed by remelting of the granitic gneiss.In contrast, in the northern Gyeonggi Massif and in the Nangrim Massif, magmatism and metamorphism related continental collision occurred at 1.93–1.91 Ga, followed by the magmatism and metamorphism in the post-collisional tectonic setting at ca. 1.88–1.85 Ga. This was followed by magmatism in the within-plate tectonic setting at ca. 1.84–1.83 Ga. The results indicate that the tectonic evolution of the southeastern Gyeonggi Massif may differ from that of the northern Gyeonggi Massif, Nangrim Massif and Jiao–Liao–Ji Belt in the North China Craton, but is similar to that of the northern Yangtze Block in the South China Craton.