

Late Paleozoic metamorphism in the Ogcheon metamorphic belt, South Korea: U–Pb stepwise leaching ages of garnet affected by allanite inclusions

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The Ogcheon metamorphic belt transecting southern part of Korean Peninsula mainly comprises low-rank amphibolite facies metasedimentary and metavolcanic rocks of Proterozoic to Paleozoic protolith age. To constrain the timing of regional metamorphism in this belt, stepwise leaching experiments were undertaken for five garnet separates from pelitic and quartz-hornblende schists. Th/U ratios defined by leaches and whole rock are in the range of ca. 3–12, reflecting the contribution of Th-rich allanite inclusions in garnet. These inclusions also affected Sm–Nd isotopic system of garnet to produce low $^{147}\text{Sm}/^{144}\text{Nd}$ ratio of 0.127–0.151. The U–Pb step-leaching ages of three samples are identical within errors, ranging from 287 ± 26 Ma to 283 ± 22 Ma, and are consistent with Sm–Nd whole rock–garnet age of 295 ± 150 Ma (all ages quoted at 2σ standard deviation). In conjunction with various lines of petrographic evidence, these results consistent among different samples and isotopic systems suggest that allanite inclusions in garnet are not detrital but metamorphic in origin. Hence, the timing of peak metamorphism in the Ogcheon metamorphic belt is confirmed to be Late Paleozoic.