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SHRIMP U-Pb zircon ages of granite gneiss and paragneiss from Oki-Dogo island, southwest Japan, and their tectonic implications

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The Hida belt, located in the northern part of southwest Japan, is considered to be a rarely preserved cratonic remnant originated from the easternmost continental margin of the Eurasian continent before the major build-up of the Japanese Islands. It is thus one of the key tectonic elements to unravel the continental accretion processes of the East Asia that have been almost accomplished at the end of the Permo-Triassic time. The gneiss in the Oki-Dogo Island is considered as a western extension of the Hida gneiss on the basis of similarities in both lithofacies and metamorphic ages. However, recent geochronologic investigations on these gneisses raised a question against the simple tectonic correlation between the Hida belt and Oki-Dogo Island (e.g., Tsutsumi et al., 2006).
In this work we report new SHRIMP U-Pb zircon ages obtained from two granite gneiss and a paragneiss (Oki gneiss) from Oki-Dogo island. Samples include garnet-bearing granite gneiss (OKI8), granite gneiss (OKI14) and garnet-biotite gneiss (OKI13). Most of zircon grains in OKI8 and OKI14 show oscillatory zoning patterns. They give almost equivalent Late Paleoprotrozoic ages of 1867±16 Ma (n=20, MSWD=2.0) and 1881±17 Ma (n= 20, MSWD=4.4) which are interpreted to date the emplacement ages of the granite protoliths. A few of zircon grains from sample OKI8 show recrystallized rims yielding Triassic metamorphic age of 235.0±6.1 Ma (n=9, MSWD=1.8). Zircon grains from OKI13 have overgrowth rims with low Th/U ratio, and gave a Late Paleoprotrozoic metamorphic age of 1867±16 Ma (n=18, MSWD=3.3) marking the timing of the paragneiss. Most of inherited cores of OKI13 zircons showing magmatic zoning patterns with high Th/U ratio gave a spectrum ranging in ages from Late Archean (up to 2693 Ma) to Early Paleotroterozoic.
The Permo-Triassic metamorphic age (∼235 Ma) obtained here is well corroborated with those reported from the Hida belt. However, formation ages (∼1.9 Ga) of the Oki Gneisses are clearly much older than the Paleozoic Hida gneiss. This study suggests a reconsideration of conventional ideas that the Oki gneiss was derived from clastic sediments of the Permo-Carboniferous (Suzuki and Adachi, 1994) or Early Proterozoic rocks (Tsutsumi et al., 2006). The Late Paleoproterozoic formation ages and the Permo-Triassic metamorphic ages recorded in the Oki Gneiss are commonly found in the gneisses from Gyeonggi massif, Korea, and thus suggest a close crustal affinity between them.

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Tsutsumi Y., Yokoyama K., Horie K., Terada K., Hidaka H., 2006, SHRIMP U-Pb dating of detrital zircons in paragneiss from Oki-Dogo Island, western Japan. Journal of Mineralogical and Petrological Science 101, 289-298.