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ベトナム北部・レッドリバー剪断帯の高温・高圧変成作用の時期：Paleogene vs. Permo-Triassic
Timing of HP and HT-UHT metamorphism in the Red River shear zone, northern Vietnam: Paleogene vs. Permo-Triassic

中野 伸彦 [1*], 小山内 康人 [1]
NAKANO, Nobuhiko[1*], OSANAI, Yasuhito[1]

[1] 九州大学・比文
[1]SCS., Kyushu Univ.

The Red River shear zone is left-lateral shear zone caused by collision of the India to the Eurasian continent at the Paleogene. Although most metamorphic rocks were reset by the deformation, recent U-Pb and Th-Pb in-situ chronological investigations have suggested complex ages from 262 to 25 Ma. In this presentation, we make clear the timing of the high-grade metamorphism using HP and HT-UHT granulites.

To realize the metamorphic conditions and timing of the high-grade event, we use the fluid inclusion technique in association with in-situ U-Pb zircon age. Abundant fluid inclusions are observed in garnet, corundum, staurolite, while are rare in quartz and zircon. Raman analysis shows that all fluid inclusions are composed of CO_2. Their average densities calculated from two Raman peaks are 1.00 +/- 0.06, 1.07 +/- 0.04, 1.09 +/- 0.03, 0.29 +/- 0.07, and 1.15 +/- 0.05 g/cm^3 for garnet, corundum, staurolite, quartz, and zircon, respectively. The low-density CO_2 fluids in quartz imply that garnet and corundum have grown up at the different stage than quartz. The estimating pressure-temperature condition based on the mineral paragenesis (exclude quartz) and isochemical phase diagrams using whole rock chemistries of 3 rock types (garnet-corundum-sillimanite, garnet-spinel-sillimanite, and garnet-corundum-spinel granulites), former eclogite-facies (>2.0 GPa at 800 C) metamorphism and subsequent decompression under granulite-facies condition (>1000 C at 1.5 GPa) are identified.

U-Pb zircon ages show wide range from 265 to 36 Ma, however dark luminescent core of zircon containing high-density CO_2 inclusions yields a concordia age of 257 +/- 8 Ma, clearly indicating time of high-grade metamorphic event. This simple technique of combining Raman microscopy and U-Pb age could be easily and widely applicable to evaluate the zircon age and mineral associations in considering pressure-temperature-time evolution of multi-metamorphic events.

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