

Early Miocene zircon U-Pb ages in the Hidaka Supergroup of the Tomuraushi area, Hokkaido : Ridge subduction or marginal basin magmatism?

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Abstract

The Hidaka Supergroup in central Hokkaido has been regarded as a Paleogene accretionary complex. It consists mainly of deformed sedimentary rocks, and is also known to contain MORB lavas and dolerites, which erupted on and intruded in unconsolidated trench sediments (in situ MORB). It has thus been considered to suggest ridge subduction in the Paleogene period. Tomuraushi area is one of the most typical localities of the in situ MORB in the Hidaka Belt. However, limited and indirect age data have been so far available for the age of MORB eruption.

Based on field mapping, we divided the Hidaka Supergroup in the Tomuraushi area into six lithological units in structurally ascending order as unit A (black mudstone), unit B (muddy turbidites), unit C (basalts and dolerites with black mudstones), unit D (red, green and black mudstone), unit E (sandy turbidites), and unit F (black mudstone). Successions from units A to C and from D to E are regarded as conformable, and the boundaries between units C and D, and between E and F as reverse faults. Therefore, the Hidaka Supergroup in this area consists of at least three thrust sheets.

We determined detrital zircon U-Pb ages for six samples of sandstone and tuff collected from units B, C, and E. Zircons from each tuff sample shows a single age cluster with weighted mean of 18-20 Ma. Zircon U-Pb ages from sandstone samples showed the youngest clusters about 22-26 Ma.

Based on the results above, sedimentary ages of units B and C is considered as 18-20 Ma, and of unit E younger than 22 Ma. The age of N-MORB eruption is contemporaneous with the unit C deposition in the Early Miocene, significantly younger than the timing of subduction of the Izanagi-Pacific Ridge along the Eurasian margin assumed in 50-60 Ma (Seton et al., 2015; Wu & Wu, 2019). Instead, the ages are coeval with zircon U-Pb ages of granulite facies metamorphism (Usuki et al., 2006) and of MORB-type gabbro (Kemp et al., 2007) in the Hidaka Metamorphic Belt to the south of the Tomuraushi area. Because the Oligocene-Early Miocene Hidaka intrusive and metamorphic events are attributed to back-arc rifting and spreading of the Kuril and Japan basins by these authors, the Tomuraushi in situ MORB could also be formed along with the same events.

References

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