

A preliminary study of the age distribution of detrital zircons in the Paleo-Mesozoic strata of the South Kitakami Belt

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INTRODUCTION U-Pb LA-ICP-MS dating of detrital zircons was carried out of the Paleo-Mesozoic succession in the South Kitakami Belt, Northeast Japan. The analyzed samples were taken from the following eight geologic units: Devonian Ono Formation, Devonian Nakasato Formation, Upper Permian Toyoma Formation, Hosoura Formation of the Lower Jurassic Shizugawa Group, Sodenohama Formation of the Middle Jurassic Hashiura Group, Oginohama and Oshika formations of the Upper Jurassic to Lower Cretaceous Oshika Group, and the Yoshinohama Formation of the Lower Cretaceous Jusanhama Group. The South Kitakami Belt retains continual succession of shallow-marine to terrestrial strata of Ordovician to Early Cretaceous times, and is very important in analyzing the long-term tectonic and environmental history of the Japanese Islands. This abstract mainly notes the analytical results of the Toyoma and Ayukawa formations.

OUTLINE OF GEOLOGY A Middle to Late Permian succession is exposed along the coast from Cape Iwaizaki to Motoyoshi Town, Kesenuma City, Miyagi Prefecture, in the eastern half of the Shizugawa-Hashiura row. The sandstone sample of the Toyoma Formation was collected from the uppermost part of the formation exposed along the Maehama coast of Motoyoshi Town. The Lower Triassic Inai Group rests upon the Toyoma Group. On the other hand, in the tip of the Oshika Peninsula, a generally southeast facing Upper Jurassic to Lower Cretaceous sequence, with some folds, is exposed. The sandstone sample of the Ayukawa Formation was collected from the Domeki Sandstone Member exposed on the Ayukawa coast, Ayukawa Town, Ishinomaki City, Miyagi Prefecture. The Lower Cretaceous Yamadori Formation, consisting of andesitic volcanic and pyroclastic rocks, rests upon the Ayukawa Formation.

RESULTS The U-Pb dating of the zircons was carried out with the LA-ICP-MS equipped in the Earthquake Research Institute of the University of Tokyo. The Toyoma sandstone contains abundant 250-Ma zircons with the youngest age of 244.2±3.3 Ma. The sample also contains zircons of 900 Ma and 400 Ma, but Mesoproterozoic or older zircons are absent. The Ayukawa sandstone contains abundant 130-Ma zircons with the youngest age of 125.9±6.3 Ma, and some 400-Ma and Paleoproterozoic zircons. Middle Jurassic to Lower Cretaceous sandstones (Sodenohama, Oginohama, and Yoshinohama formations) do not contain 160 Ma or younger zircons and the youngest age of detrital zircons in each sample is younger than the age inferred from index fossils.

DISCUSSION Although Paleoproterozoic rocks are widely exposed in the North China Block, the Toyoma Formation does not contain Paleoproterozoic zircons but contains 900-Ma zircons probably marking the formation of the South China Block. However further study is needed to search for 900-Ma igneous rock bodies from, for example, the Ogcheon Belt of Korea or Central Asian Orogenic Belt. Although the Permian-Triassic boundary in the Motoyoshi section was usually drawn between the Toyoma Formation and Inai Group, this study indicates a possibility that the Permian-Triassic boundary is in the upper part of the Toyoma Formation. The 130-Ma age of zircons, abundantly contained in the Ayukawa Formation, is the age of metamorphic core complexes sporadically distributed in the North China Block and Central Asian Orogenic Belt, the age of igneous rocks commonly distributed along the eastern coast of the South China Block. We have to look for another signature of North China or South China Block. 158-110 Ma (= magmatic hiatus in Korea; Sagong et al., 2005) zircons are absent in other Middle Jurassic to Lower Cretaceous sandstones. The fact indicates that detrital materials from Korea or North China Block largely contributed to the deposition of these sandstones.

Keywords: U-Pb age, detrital zircon, LA-ICP-MS, South Kitakami Belt, Northeast Japan