

Detrital zircon geochronology of the Tetori Group in the Arimine and Itoshiro areas, central Japan

KAWAGOE, Yuta¹ ; SANO, Shin-ichi² ; ORIHASHI, Yuji³ ; KOUCHI, Yoshikazu^{1*} ; UEDA, Tetsuya¹ ; YAMAMOTO, Koshi⁴ ; OTOH, Shigeru¹

¹Grad. School Sci. Eng., Univ. Toyama, ²Fukui Prefectural Dinosaur Museum, ³ERI, Univ. Tokyo, ⁴Grad. School Env. Stu., Nagoya Univ.

Introduction Provenance of the Tetori Group in the Arimine (Toyama-Gifu prefs.) and Itoshiro (Fukui Pref.) areas was analyzed using detrital zircon age distribution. In the course of the study, zircon ages of the Hida gneiss and granitoid were also determined.

Geologic Setting The Tetori Group consists of Middle Jurassic to Early Cretaceous shallow marine to terrestrial deposits. The group is divided, in ascending order, into the Kuzuryu, Itoshiro, and Akaiwa subgroups in the Itoshiro area (Maeda, 1961), and into the Higashisakamori, Nagatogawa, and Atotsugawa formations in the Arimine area (Kawai & Nozawa, 1958); the lower, middle, and upper units of the two areas have been correlated with each other. The lower members of the Nagatogawa-Atotsugawa formations consist of gravelly deposits of eastward running braided rivers, whereas the upper members consist of sandstone and mudstone of southward running meandering rivers. The U-Pb age of a tuff bed in the upper member of the Atotsugawa Formation is 120.0 +/- 1.2 Ma.

Zircon ages from surrounding areas The Hida Gneiss to the west of the Arimine area contains abundant 250-220-Ma zircons (Sano et al., 2000). The Korean Peninsula is mainly occupied by Archean-Paleoproterozoic basements of the Nangnim and Yeongnam massifs, covered with Cambrian-Jurassic deposits and cut by 250-160-Ma granitic rocks (e.g. Zhao et al., 2005). On the other hand, Northeast China between the Jiamusi Massif and the Songliao Basin, famous for " Phanerozoic crustal growth " (Wu et al., 2000), is composed primarily of 250-160-Ma granitic rocks and virtually no Precambrian rocks.

Samples and method of study U-Pb ages of zircons from (1) sandstone and sandy siltstone samples from six formations (members) of the Tetori Group from each area, (2) the Shimonomoto, Funatsu and Utsubo bodies of the Hida granite around the Arimine area, and (3) the Hida meta-granite on the north of the Arimine area were determined with laser ablation inductively coupled mass spectrometers (LA-ICP-MS) equipped in the Earthquake Research Institute of the University of Tokyo and Graduate School of Environmental Studies, Nagoya University.

Results There was marked difference in the percentage of Precambrian zircons (%Pc) between the Itoshiro-Akaiwa subgroups and the Nagatogawa-Atotsugawa formations: i.e. the %Pc of the former is 80 or more whereas that of the latter is less than 10. The samples of the Itoshiro-Akaiwa subgroups contained abundant 2500-1500-Ma zircons and a couple of Archean zircons. Age peaks of 190-170-Ma and 250-220-Ma were commonly seen for all samples of the Tetori Group. Among them, the peak of 250-220-Ma was higher in the braided river deposits and that of 190-170-Ma was higher in the meandering river deposits in the Arimine area. The Shimonomoto, Funatsu, Utsubo, and meta-granite bodies mainly contained 200-180-Ma, 250-190-Ma, 205-185-Ma, and 280-220-Ma zircons, respectively, and 180-170-Ma zircons were rare in the Hida Belt.

Discussion The meandering-river deposits in the Arimine area contain abundant 180-170-Ma zircons, which are virtually absent in the Hida Belt, and very few Precambrian zircons (%Pc <10). The catchment of the meandering rivers must have been occupied by Triassic-Jurassic igneous rocks with narrow exposures of Precambrian rocks. Considering the geology of eastern margin of Asia, the meandering rivers most likely passed through Northeast China (Jiamusi-Songliao). On the other hand, the braided river deposits of the area contain many 250-220 Ma zircons, suggesting that they were likely supplied at the time of uplifting of the Hida gneiss to the west. On the other hand, the Itoshiro-Akaiwa subgroups have abundant Precambrian zircons (%Pc >80). Possible candidates of the Precambrian exposure that could supply the sediments of these subgroups are the Yeongnam-Nangnim massifs. Hence the sediments of the Itoshiro-Akaiwa subgroups were likely carried by rivers that passed through the massifs.

Keywords: U-Pb age, detrital zircon, LA-ICP-MS, Tetori Group, Northeast China, East Asia