Late Jurassic-Early Cretaceous dextral shearing along the eastern margin of Asia

*Shigeru Otoh[1], Takuya Harada[1], Miwa Yokogawa[1], Mitsuhiro Nagata[1], Yoshimi Hayashi[2], Yoshikazu Kouchi[1], Koshi Yamamoto[3]

1.Graduate School of Science and Engineering (Science), University of Toyama, 2.Faculty of Science, University of Toyama, 3.Graduate School of Environmental Studies, Nagoya University

This study aims to clarify the Late Jurassic-Early Cretaceous tectonic evolution of the Japanese Islands. To accomplish the purpose, we obtained detrital-zircon-age spectra from Middle Jurassic-Early Cretaceous strata of the Hida, North Kitakami, and Southern Chichibu belts of Japan and compared them with an age distribution map of igneous rocks in East Asia. Here follow the results and discussion. %Pc in the following sentences denotes the percentage of Precambrian zircons in the detrital zircons from a rock sample.

Hida Belt, Inner Zone of SW Japan: Middle Jurassic to Early Cretaceous Tetori Group is distributed in the Hakusan (western) and Jinzu (eastern) regions of the Hida Belt. The Tetori Group in the Hakusan Region showed a %Pc increase from 5.4 (Upper Jurassic) to more than 80 (Lower Cretaceous). The group in the Jinzu Region, on the other hand, showed %Pc increase in the Aptian (Early Cretaceous) from less than 10 to 32, together with the intercalations of red bed that indicate warm and dry climate. Kawagoe et al. (2014) suggested, from the distribution and age of igneous rocks in East Asia, that the hinterland of the Lower Cretaceous in the Hakusan Region, with very high %Pc, was the Korean Peninsula, whereas that in the Jinzu Region, with very low %Pc, was northeast China. We propose that the Aptian increase of %Pc in the Jinzu Region implies an up to 500 km western shift (in the present coordinate) of the Hida Belt relative to Asia and an approach of the Jinzu Region to the Korean Peninsula where Paleoproterozoic igneous rocks were widely exposed.

North Kitakami Belt, NE Japan: Middle Jurassic accretionary complex (AC) contained abundant Precambrian zircons (%Pc=59-87) together with some 190-170-Ma (earlier Jurassic) ones. The Lower Cretaceous cover, on the other hand, characteristically contained 140-120-Ma zircons, the age range in the magmatic hiatus in Korea (Sagong et al., 2005) and yielded the Ryoseki-type flora that flourished in South China. The data suggest that the hinterland of the Middle Jurassic AC was the Korean Peninsula, where Precambrian and Triassic to earlier Jurassic igneous rocks are widely exposed. The Lower Cretaceous cover, containing 140-120-Ma zircons and the Ryoseki-type flora, was presumably deposited along the northern segment of the South China coast where later Jurassic and Early Cretaceous igneous rocks are widely exposed. We thus propose that the geologic entity containing the Jurassic AC of the North Kitakami Belt shifted up to 1,500 km southward to South China coast in Late Jurassic to earliest Cretaceous times.

Southern Chichibu Belt, Outer Zone of SW Japan: Middle Jurassic AC contained abundant Precambrian zircons (%Pc>50) together with some early Mesozoic (250-170 Ma) ones. Late Jurassic AC, on the other hand, showed less %Pc (<30) and contained more than 50% of later Jurassic (170-150 Ma, overlapping the period of the magmatic hiatus in Korea) zircons. The data suggest that the hinterland of the Middle Jurassic AC was the Korean Peninsula, where Precambrian and Triassic to earlier Jurassic igneous rocks are widely exposed. The Late Jurassic AC, containing many later Jurassic zircons was presumably deposited along the northern segment of the South China coast where later Jurassic and Early Cretaceous igneous rocks are widely exposed with some Precambrian basement rocks. We thus propose that the geologic entity containing the Middle Jurassic AC of the North Kitakami Belt shifted up to 1,500 km southward to South China coast in a period including Middle to Late Jurassic times.

We thus found evidence for Late Jurassic to Early Cretaceous dextral movement relative to Asia from

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three geologic belts. The amount of displacement seems to be larger in the Pacific side belts. North-dipping dextral shear zones in the Ultra-Tamba and northern Tamba belts, Inner Zone of SW Japan, may have accommodated the dextral motion.

Keywords: detrital zircon, U-Pb dating, Japanese Islands, East Asia, Mesozoic

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