Paleo-Mesozoic assembly and rearrangement of proto-Japan: Insights from paleobiogeography and detrital-zircon-age spectra
Shigeru OTOH (University of Toyama)

Paleo-Mesozoic tectonic development of proto-Japan is discussed on the basis of paleobiogeography and detrital-zircon-age spectra.

**Paleobiogeography** Most of the Middle Permian to Middle Jurassic (Callovian) shallow- and non-marine beds in Japan were deposited in a northern Tethys–Pacific region (e.g. Tazawa, 1993). The paleobiogeographic setting diverged in the early Late Jurassic. The Oxfordian–Barremian beds in the Inner Zone of SW Japan were deposited in the temperate and humid Tetori-type floristic province, whereas the coeval beds in NE Japan and the Outer Zone of SW Japan were deposited in the subtropical–tropical and arid Ryoseki-type floristic province (e.g. Ohana and Kimura, 1995). The Ryoseki-type flora invaded the Inner Zone of SW Japan from the Aptian and the paleobiogeographic contrast became unclear (Yabe et al., 2003; Umetsu and Sato, 2007).

**Detrital-zircon-age spectra**

**Types of age spectrum** Five types of age spectrum were discriminated from the Paleo–Mesozoic sandstone of Japan. Type U is a unimodal type (a single peak at the age of deposition), indicating the deposition along the active margin of an oceanic island arc. Type M1 is a multimodal type (three peaks at the age of deposition, 500 Ma, and 900 Ma), indicating the deposition along a margin of the Khanka–Jiamusi Block. Type M2 is another multimodal type (a large peak at the age of deposition (400–450 Ma) and small Neo- to Paleoproterozoic peaks), indicating the deposition along a Gondwanan margin. Type B is a bimodal type (two peaks at the age of deposition and at 1,800–2,000 Ma), indicating the deposition along a margin of North China. Type K characteristically contains Early Cretaceous (100–140 Ma) zircons.

**Temporal and spatial change of detrital-zircon-age spectra**

**Inner Zone of SW Japan** [Hida Gaien Belt] The age spectra changed from type U (Middle Permian–Lower Triassic; depositional age) through type M1 (Middle Triassic) to type B (Lower Cretaceous; Kawagoe et al., 2012, 2013). [Renge Belt] The age spectra changed from type M2 (Devonian) to type B (Lower Jurassic cover). [Akiyoshi Belt] The age spectra changed from type U (Permian accretionary complex (AC)) to type B or M1 (Upper Triassic cover). [Suo Belt] The age spectra of downward-younging high P/T metamorphic rocks changed from type U (Permian) to type B (Triassic–Jurassic). [Ultra Tamba and Tamba belts] The age spectra of ACs changed from type U (Permian) to type B or M1 (Triassic–Jurassic).

**Outer Zone of SW Japan** [Northern Chichibu Belt] The age spectra of ACs changed from type U or M1 (Permian) to type B (Jurassic), and the Lower Cretaceous cover shows type K age spectra. [Kurosegawa Belt] The age spectra changed from type B (Middle–Late Jurassic) to type K (Lower Cretaceous). [Southern Chichibu Belt] The age spectra of a downward-younging AC changed from type B (Middle Jurassic) through type U (Upper Jurassic) to type K (Lower Cretaceous).

**NE Japan** [South Kitakami Belt] The age spectra changed from type M2 (Silurian–Carboniferous) through types U (Permian–Lower Jurassic) and B (Middle–Late Jurassic) to type K (Hauterivian; Okawa et al., 2013). [North Kitakami Belt] The age spectra changed from type B (Middle–Upper Jurassic AC) to type K (Lower Cretaceous cover).

**Assembly of proto-Japan** The Middle Paleozoic sandstone (type M2), having Grenvillian and Pan-African zircons, was mostly deposited along a margin of Gondwana. The Upper Paleozoic–Lower Mesozoic sandstone (type U) was probably deposited in an oceanic island arc–trench setting. Supply of Precambrian zircons from a continent (or continents) started again from Middle Triassic (Hida Gaien Belt)–Middle Jurassic (South Kitakami Belt) times. These lines of evidence suggest that separate island arcs derived from Gondwana successively assembled and formed proto-Japan in the Early Mesozoic.

**Rearrangement** The Lower Cretaceous sandstone in NE Japan and the Outer Zone of SW Japan contained certain amounts of Early Cretaceous zircons (type K). The distribution of Early Cretaceous igneous rocks is limited in the Anhui, Zhejiang, and Guangdong provinces of South China and in some extensional basins of the Central Asian Orogenic Belt. Coeval igneous rocks are absent in Korea (magmatic hiatus of 158–110 Ma: Sagong et al., 2005). Combining the paleobiogeographic data, I interpret that these Lower Cretaceous beds were deposited along the Zhejiang–Guangdong coast and moved relatively northward by sinistral strike-slip faulting along the eastern coast of Asia by the Aptian (during the magmatic hiatus).

**References**