

Permian-Jurassic evolution of the arc-trench system of Japan along the eastern margin of continental Asia

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INTRODUCTION Permian-Jurassic arc-trench system forms the backbone of the Japanese Islands. This study added new LA-ICP-MS U-Pb detrital zircon ages from sandstone of accretionary complexes (AC's) in Southwest (SW) Japan to the results of previous studies, and outlined Permian-Jurassic evolution of the arc-trench system of Japan. We studied sandstone samples of the following geologic units: Akiyoshi AC (Ota Group), Ultra-Tamba AC (Kamitaki and Ajima formations), and Mino AC (Kamiaso Formation) in the Inner Zone of SW Japan. In addition, we studied sandstone samples from the Chichibu Composite Belt (Agekura Formation and Ryokami Unit) of the Outer Zone of SW Japan, although the results are omitted from this abstract.

OUTLINE OF GEOLOGY The Akiyoshi AC consists of Early Carboniferous to late Middle Permian pelagic sedimentary rocks, and late Middle Permian to early Late Permian siliciclastic rocks (e.g. Kanmera *et al.*, 1990). The period of deposition of the oceanic-plate stratigraphy (OPS) ranges 90 m.y. The Ultra-Tamba AC on the other hand consists of Middle to Late Permian pelagic sedimentary rocks, and Late Permian to Middle Triassic siliciclastic rocks (e.g. Sugamori, 2008, 2011), indicating that the OPS was deposited in much shorter period than that of the Akiyoshi AC. The Mino AC consists of Late Carboniferous to Middle Jurassic pelagic sedimentary rocks, and Late Triassic to earliest Cretaceous siliciclastic rocks (e.g. Wakita, 1988).

RESULTS All sandstone samples are of lithic or feldspathic sandstone, and those from the Akiyoshi and Ultra-Tamba AC's contain high proportion of volcanic rock fragments, suggesting that the youngest zircon age is close to the age of deposition. The youngest ages are 253.9 \pm 6.9 Ma for the Ota Group, 238.0 \pm 3.9 Ma for the Kamitaki Formation, and 248.3 \pm 5.2 Ma for the Ajima Formation. These samples contain virtually no Precambrian zircons, and 90% or more zircons in each sample are of 300 Ma or younger. On the other hand 54% of zircons in the sandstone sample of the Kamiaso Formation are of Precambrian.

DISCUSSION From the age distribution of the detrital zircons, the sedimentary tectonic setting of the samples except that of the Kamiaso Formation is a forearc basin or trench of an oceanic island arc started to develop at about 300 Ma. The Ultra-Tamba AC is interpreted to have accreted to the Maizuru Oceanic Island Arc (e.g. Hayasaka *et al.*, 1996), the original geologic entity of the Maizuru Belt. The Akiyoshi AC, on the other hand, is now distributed on the continental side of the Maizuru Belt, but we interpret that it was also originally accreted to the Maizuru Arc. The 310-235Ma zircons, abundantly extracted in the present study, have also been reported from pyroclastic to volcanoclastic rocks of the Nishiki and Ota groups of the Akiyoshi Belt, the Maizuru Group of the Maizuru Belt, and the Motodo Formation of the Hida Gaien Belt. The provenance oceanic island arc of the sandstones in the present study, may have supplied the constituent grains of these pyroclastic to volcanoclastic rocks.

From the results and discussion presented above, Permian-Jurassic evolution of the arc-trench system of Japan can be summarized as follows.

1. An old oceanic plate was subducted beneath the Maizuru Oceanic Island Arc initiated at about 300 Ma (Early Permian) and formed the Akiyoshi AC in Late Permian. The Yakuno igneous complex and the basal tuff breccia of the Motodo Formation in the Hida Gaien Belt are traces of igneous arc at that time.

2. A young oceanic plate or marginal sea plate was subducted beneath the Maizuru Arc and formed the Ultra-Tamba AC in Early to Middle Triassic. The granitoids in the Hida Belt and the Korean Peninsula are traces of igneous arc at that time.

3. In Jurassic, the Maizuru Arc changed into a continental arc and an old oceanic plate was subducted beneath it and formed the Mino AC. The granitoids in the Korean Peninsula are a trace of igneous arc at that time.

Keywords: U-Pb age, detrital zircon, LA-ICP-MS, Permian-Jurassic evolution of arc-trench system, eastern margin of continental Asia, Maizuru Oceanic Island Arc