

Contribution of two arc-trench systems to the formation of proto-Japan

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The Japanese Islands are assumed to have developed for 500 m.y. in a single arc-trench system along the continental margin of East Asia (e.g. Isozaki and Maruyama, 1990). However, our preliminary study of age distribution of detrital zircons in Paleozoic sandstones and psammitic schists of Japan, together with previous geological studies, has revealed that the Japanese Islands contain elements of at least two arc-trench systems that initiated by Jurassic Period. Here follow the summary of our data and their implications.

CAMBRIAN?-EARLY PERMIAN ARC-TRENCH SYSTEM In the South Kitakami Belt, arc igneous activity had started by 466 Ma (Middle Ordovician) and Siluro-Devonian sandstone contains high proportion of Precambrian detrital zircons (Shimojo et al., 2010), suggesting that the igneous activity took place in a continental arc. Our new dating results also added evidence for Middle Paleozoic felsic volcanic activity in the South Kitakami Belt; the upper age limits of tuffaceous sandstone samples of the Ono and Nakasato formations are 424.8 \pm 7.4 Ma and 392.6 \pm 5.3 Ma, respectively. Previous stratigraphic studies suggest that the arc igneous activity lasted until Early Permian (e.g. Kawamura et al., 1990). Geologic belts and units containing the elements of the arc-trench system in and around this age range can be listed as follows: Cambrian Daioin Granites and the Akazawa Formation in the Hitachi area of the Abukuma Belt (Tagiri et al., 2011), Hida Gaien Belt (e.g. Tsukada, 1997), Kurosegawa Belt, Oeyama Ophiolite (Arai, 1980; Tsujimori et al., 2005), 300 Ma high-P/T metamorphic rocks of the Renge and Nedamo belts (Nishimura, 1998; Uchino et al., 2008), and accretionary complex (AC) of the Nedamo Belt (Uchino et al., 2005). These elements likely formed an arc-trench system in Cambrian to Early Permian times, where the sedimentary complex of the Nedamo Belt and high-P/T metamorphic rocks of the Renge and Nedamo belts accreted to a continental arc that formed pre-Middle Permian igneous rocks in the South Kitakami, Kurosegawa, and Hida Gaien belts. The South Kitakami Belt retains only a little evidence for Middle Permian to earliest Cretaceous igneous activity.

EARLY PERMIAN-EARLIEST CRETACEOUS ARC-TRENCH SYSTEM Zircon data of non-metamorphosed Late Permian to Middle Triassic AC are reported by Morita et al. in this abstract volume. In west Chugoku region, the constituent rocks of the Maizuru or Akiyoshi belt are underlain by the metamorphic rocks of the Suo Belt, and the youngest age of detrital zircons in psammitic schist samples of the Suo Belt gradually becomes younger downward, from 220 Ma to 180 Ma. In east Chugoku to Kinki regions, the Ultra-Tanba AC is underlain by the Late Triassic to earliest Cretaceous Tanba-Mino AC, which also has downward-younging age polarity according to previous studies of radiolarians. On the other hand, we found that the ages of basal tuff breccia of the Motodo Formation (Hida Gaien Belt) and felsic tuff of the Maizuru Group (Maizuru Belt) are 254.2 \pm 2.5 Ma and 276 \pm 16 Ma, respectively. Moreover Triassic to Jurassic granitoids have been well known in the Hida Belt and the Korean Peninsula.

Previous studies have already demonstrated that the main part of the Maizuru Belt is composed of rocks and strata of an oceanic island arc-backarc basin system initiated in Early Permian time (e.g. Hayasaka et al., 1996). We tentatively assume that the Permian to earliest Cretaceous elements listed above formed an arc-trench system, which initiated as the Maizuru oceanic arc-trench system in Early Permian and gradually evolved to a continental arc-trench system. Precambrian zircons from continental basements were supplied to the trench from Middle-Late Triassic times. We thus interpret that the arc-trench system that formed the framework of proto-Japan shifted from "South Kitakami continental arc-trench system" to "Maizuru oceanic island arc-trench system" in Early Permian.

Keywords: U-Pb age, detrital zircon, LA-ICP-MS, proto-Japan, two arc-trench systems