

Contribution of Precambrian clastic materials to the Jurassic accretionary complexes of Japan

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INTRODUCTION Jurassic accretionary prisms are distributed in three geologic belts in Southwest Japan: in the Tanba-Mino, Northern Chichibu, and Southern Chichibu belts from the present-day continental side. There are two contrasting ideas on the origin of this parallel distribution of accretionary prisms. (1) The three Jurassic accretionary prisms form a single tabular geologic unit beneath Paleozoic geologic units and expose along two axes of anticline and the southern limb of the southernmost syncline; and (2) the accretionary prisms were formed along a single subduction zone but have rearranged to the present form by Cretaceous sinistral movements along the Kurosegawa Tectonic Belt and the Median Tectonic Line. This study aims to compare the petrography and the age-distribution of detrital zircons of sandstone samples from the three geologic belts, and to give a constraint to the problem mentioned above.

SAMPLES AND METHOD Sandstone samples were collected from the chert-clastics sequences from the three belts. A Middle Jurassic sandstone sample (11072401) was collected from the Kamiase Formation of the Tanba-Mino Belt, another Middle Jurassic sample (11031503) from the Nakaoi Unit of the Northern Chichibu Belt, two Middle Jurassic samples (11031403, 11031601) and two Middle to Upper Jurassic samples (11031602, -05) the Togano Unit of the Southern Chichibu Belt. Thin sections of each sample were prepared and their modal compositions were calculated through the standard point-counting method under microscope. On the other hand, 200 zircons were collected for each sample through standard crushing, panning and heavy-liquid techniques. The U-Pb dating of the zircons was carried out with the LA-ICP-MS equipped in the Earthquake Research Institute of the University of Tokyo.

RESULTS The modal analysis indicates that all the samples are of lithic sandstone, but with substantial proportion of quartz and feldspar grains and with virtually no volcanic-rock fragments. The youngest age of detrital zircons in each sample approximately corresponds to the age of underlying mudstone inferred from radiolarian biostratigraphy. The proportion of Precambrian zircons decreases from the Middle Jurassic sandstone of the Mino Belt (54%), through the coeval sandstone of the Northern Chichibu Belt (26%) and Southern Chichibu Belt (16-15%), to the Middle to Upper Jurassic sandstone of the Southern Chichibu Belt (9-8%).

DISCUSSION The proportion of Precambrian zircons in the four Middle Jurassic sandstone samples indicates that the Mino sandstone was deposited in a trench close to the North China Block where Precambrian basement rocks were widely exposed; the Northern Chichibu sandstone may have been deposited in a little farther part of the trench from the North China Block than the Mino sandstone, and the Southern Chichibu sandstone in a much farther part. The interpretation is concordant with model (2) in the first paragraph. The petrography of the sandstones, on the other hand, indicates the deposition in front of a recycled orogenic belt. The petrographical characteristics are discordant with the normal arc-trench system and need further examination.

Keywords: U-Pb age, detrital zircon, LA-ICP-MS, Mino Belt, North chichibu Belt, South chichibu Belt