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New U-Pb analyses of detrital zircons from Permo-Triassic sandstone in Japan

Sachiko Morita[1*], Hokuto Obara[1], Yoshikazu Kouchi[1], Tatsuya Fujimoto[1], Hiroyuki Okawa[1], Yuta Kawagoe[1], Miwa Yokogawa[1], Yuji Orihashi[2], Shigeru Otoh[3]

[1]Grad. School Sci. Eng., Univ. Toyama, [2]ERI, Univ. Tokyo, [3]Grad. School Sci. Eng., Univ. Toyama

INTRODUCTION This study adds new U-Pb analytical data of detrital zircons from Permo-Triassic sandstone in SW Japan, and outlines Permo-Triassic sedimentary environment. We studied the samples from the following units: Akiyoshi accretionary complex (AC), Ultra-Tamba AC, Tamba-Mino AC and Maizuru Terrane in the Inner Zone of SW Japan, and Northern Chichibu Belt (NCB), Kurosegawa Tectonic Belt (KTB) and Southern Chichibu Belt (SCB) of the Outer Zone of SW Japan.

OUTLINE OF GEOLOGY The Akiyoshi AC is a Middle to Late Permian AC, covered by Upper Triassic clastic rock unis (e.g. Mine Group (Gp.); Kanmera et al., 1990). The Ultra-Tamba AC is a Late Permian to Middle Triassic AC (e.g. Ishiga, 1990; Sugamori, 2008, 2011). The Maizuru Terrane is lithologically divided into three zones: Northern (Yakuno felsic rocks), Central (Permo-Triassic Gps.) and Southern (Yakuno mafic rocks) zones (Kano et al., 1959). The Permian Maizuru Gp. in the Central zone has been unconformably covered by the Lower-Middle Triassic Yakuno and Upper Triassic Nabae Gps. The KTB includes lenticular bodies of granitoids, metamorphic rocks, and Silurian to Early Cretaceous shallow marine beds. The Tamba-Mino Belt, NCB, and SCB consist mainly of Jurassic AC, with some Permian AC (Sawadani Unit) and Permo-Triassic clastic rocks.

RESULTS The results listed below are presented in the following order: the shape of the probability density plot (peak ages +/- width (Ma); main peaks are in bold letters), percentage of Precambrian zircons (%Pc), the youngest concordia age with the 2SD error (YZ).

Akiyoshi Belt (1. Shimomidani Formation (Fm.))

1. quasi-unimodal (**270 +50/-30 Ma**, 400 Ma), %Pc = 0, YZ = 250 +/- 14 Ma

Maizuru Belt (2. Maizuru Gp., 3. Yakuno Gp., 4. Nabae Gp.)

2. quasi-unimodal (**260 +190/-30 Ma**, 430 Ma, 2080 Ma), %Pc = 4.1, YZ = 254.0 +/- 6.9 Ma

3. quasi-bimodal (**260 +120/-20 Ma**, **500 +20/-70 Ma**, 910 Ma, 1855 Ma), %Pc = 8.3, YZ = 244.6 +/- 6.1 Ma

4. multimodal (**250 +120/-40 Ma**, **510 +90/-80 Ma**, **900 +70/-100 Ma**, 1090 Ma, 1260 Ma), %Pc = 14.5, YZ = 222.3 +/- 6.1 Ma

Ultra Tamba Belt (5. Ajima Fm., 6. Kamitaki Fm., 7. Higashimata Fm.)

5. quasi-unimodal (**260 +40/-20 Ma**, 1530 Ma), %Pc = 2.0, YZ = 248.5 +/- 5.1 Ma

6. quasi-unimodal (**245 +75/-15 Ma**, 395 Ma), %Pc = 0, YZ = 238.1 +/- 3.8 Ma

7. quasi-bimodal (**260 +280/-20 Ma**, **900 +1060/-140 Ma**, 2690 Ma), %Pc = 25.4, YZ = 246.2 +/- 6.9 Ma

Tamba-Mino Belt (8. Shimamoto Fm., 9. Otaki Unit)

8. quasi-bimodal (**265 +/- 25 Ma**, **470 +40/-100 Ma**, 1400 Ma), %Pc = 5.1, YZ = 246.6 +/- 5.1 Ma

9. multimodal (**253 +53/-88 Ma**, 370 Ma, **509 +52/-76 Ma**, 750 Ma, **942 +44/-168 Ma**), %Pc = 12.5, YZ = 184.2 +/- 5.8 Ma

Northern Chichibu Belt (10. Agekura Fm.)

10. quasi-unimodal (**265 +45/-25 Ma**, 375 Ma), %Pc = 0, YZ = 250.7 +/- 3.4 Ma

Kurosegawa Belt (11. Nariki Fm., 12. Katsura sandstone)

11. quasi-unimodal (**255 +25/-15 Ma**, 465 Ma, 1740 Ma), %Pc = 7.3, YZ = 250.4 +/- 5.8 Ma

12. unimodal (**280 +30/-40 Ma**), %Pc = 0, YZ = 249.9 +/- 6.8 Ma

Southern Chichibu Belt (13. Ryogami Unit)

13. quasi-unimodal (**260 +110/-30 Ma**, 490 Ma, 1860 Ma), %Pc = 2.4, YZ = 235.1 +/- 9.1 Ma

DISCUSSION

Middle-Upper Permian sandstone that shows unimodal age distribution with very low %Pc and was most likely deposited in an oceanic island-arc setting is scattered nationwide.

Triassic sandstone was differenciated from Permian into three age-distribution types: unimodal (South Kitakami Belt (Okawa et al., 2013) and Ultra-Tamba Belt except the Higashimata Fm.), bimodal (Mine Gp.), and multimodal (Maizuru Belt, Otaki Unit., Higashimata Fm. and Shimamoto Fm.). The unimodal type shows an oceanic island-arc environment. The bimodal Mine Gp. shows the supply of 1900 Ma zircons from the North China Block (Obara et al., 2013). The multimodal type shows the zircon supply from a Gondwana-derived continental block that presently lies in the Central Asian Orogenic Belt.

Keywords: U-Pb age, detrital zircon, LA-ICP-MS, oceanic island-arc, Central Asian Orogenic Belt, North China Block