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Detrital zircon age distribution of Jurassic geologic units of Japan: New data and their implications

Miwa Yokogawa[1*], Hokuto Obara[1], Hiroyuki Okawa[1], Yuta Kawagoe[1], Sachiko Morita[1], Yoshikazu Kouchi[1], Takuya Harada[1], Yuji Orihashi[2], Shuichi Yanai[2], Shigeru Otoh[4]

[1]Grad. School Sci.Eng., Univ. Toyama, [2]Earthquak Research Institute, the University of Tokyo, [3]Japan Geocommunications Co. Ltd, [4]Grad. School Sci.Eng., Univ. Toyama

U-Pb analyses of detrital zircons were carried out of major Middle-Late Jurassic geologic units of Japan to reconstruct the tectonic history.

RESULTS The results are listed 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).

Hida Gaien Belt (1. Bathonian Tochimochiyama Formation (Fm.) of the Tetori Group)
1. bimodal (**213+66/-45 Ma**, **1776+220/-212 Ma**), %Pc = 39.5, YZ = 172 Ma
Mino Belt (2. Bathonian Kamiaso Unit)
2. quasi-bimodal (**179+17/-13 Ma**, 245+12/-17 Ma, **1826+637/-277 Ma**), %Pc = 53.8, YZ = 172 Ma
Northern Chichibu Belt (3. Bajocian-early Bathonian Nakaoi Unit)
3. quasi-bimodal (**183+88/-33 Ma**, 500 Ma, 1000 Ma, **1805+61/-108 Ma**), %Pc = 33.3, YZ = 163 Ma
Southern Chichibu Belt (Accretionary complex (AC) of 4. Bajocian Ogawa Belt, 5. Callovian Kobiura Belt, 6. Callovian Nishiyama I Belt, 8. Oxfordian Nishiyama II Belt, and 7. Oxfordian Naradani Fm., unconformably covering the AC of Kobiura and Nishiyama I belts)
4. bimodal (**250+86/-94 Ma**, **1848+304/-102 Ma**), %Pc = 47.4, YZ = 175 Ma
5. bimodal (**249+151/-95 Ma**, **1804+758/-316 Ma**), %Pc = 85.5, YZ = 166 Ma
6. quasi-bimodal (**176+129/-6 Ma**, 370 Ma, **1857+825/-190 Ma**), %Pc = 72.6, YZ = 175 Ma
7. quasi-bimodal (**173+79/-14 Ma**, 600 Ma, **1867+573/-127 Ma**), %Pc = 73.0, YZ = 171 Ma
8. quasi-unimodal (**170+40/-20 Ma**, 1790+276/-150 Ma), %Pc = 7.3-20.6, YZ = 157-160 Ma
South Kitakami Belt (9. Toarcian Hosoura Fm. of Shizugawa Gp., 10. Bajocian Aratozaki Fm. and 11. Oxfordian-Kimmeridgian Sodenohama Fm. of Hashiura Gp.)
9. quasi-unimodal (**255+/-30 Ma**, 373 Ma), %Pc = 0, YZ = 238 Ma
10. quasi-unimodal (**281+38/-191 Ma, 387 Ma**, 1929+146/-152 Ma), %Pc = 11.8, YZ = 166 Ma
11. quasi-unimodal (**180+101/-22 Ma**, 500 Ma, 1000 Ma, 1825+21/-100 Ma), %Pc = 10.8, YZ = 166 Ma
North Kitakami Belt (12. Oxfordian-Kimmeridgian Magisawa Fm.)
12. bimodal (**184+174/-26 Ma**, 1894+1141/-274 Ma), %Pc = 60.8, YZ = 168 Ma

JUNCTION OF OCEANIC ISLAND ARC AND CONTINENT The quasi-unimodal age distribution of the Hosoura Fm.[9)] with 0 %Pc strongly suggests its deposition on an oceanic island arc (OIA). The Middle-Upper Jurassic Aratozaki[10)] and Sodenohama[11)] Fms., on the other hand, show a contribution of ca. 2000 Ma zircons, most likely products of igneous activity during the amalgamation of the North China Block (NCB). The Early Jurassic OIA must have adjoined the NCB by Bajocian.

COMPARISON OF THE MIDDLE JURASSIC OF JAPAN Most of the Middle Jurassic sandstone in Japan[1),2),3),4),5),6),10)] shows bimodal to quasi-bimodal age distribution with a ca. 2000 Ma peak, indicating connection with the NCB, although the Aratozaki sandstone[10)] shows lower %Pc values. Moreover the Nakaoi sandstone[3)] of the Northern Chichibu Belt has slightly lower %Pc than the other sandstone in AC's and has received a supply of 500 Ma and 1000 Ma zircons.

WAS TOGANO UNIT FORMED THROUGH CONTINUAL OFF-SCRAPING? The Oxfordian Naradani Fm.[7)] and the underlying AC's of the Kobiura5) and Nishiyama I[6)] belts show a similar age distribution, characterized by a ca. 2000 Ma peak. They must have deposited along the margin of NCB. The Nishiyama II sandstone, on the other hand, shows a different age distribution with lower %Pc values, suggesting its deposition apart from the coeval Naradani sandstone. The Togano unit, proposed as a typical AC formed through continual off-scraping, can be subdivided into at least two subunits formed at different sites and later juxtaposed by faulting.

DIFFERENCE BETWEEN THE NORTH AND SOUTH KITAKAMI BELTS The Oxfordian Sodenohama Fm.[11)] and coeval Magisawa Fm.[12)] show significantly different age distribution. They must have deposited at different sites and have later juxtaposed. Wide ductile shear zones with prominent horizontal lineation run along the western margin of the North Kitakami Belt (Otoh and Sasaki, 2003). This is an item of evidence for the above post-depositional rearrangement.

Keywords: the shape of the probability density plot, South Kitakami Belt, North Kitakami Belt, Togano unit, Naradani Formation,

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North China Block