Huge difference of $^{87}Sr/^{86}Sr$ ratios between adjacent, same-aged seamount type limestones in Japan

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Age of adjacent limestones determined by conodont

The limestones at Mt. Ishimaki and Mt. Zao (in Tahara city), central Japan, have only 20 km distance. Both are the exotic blocks in the Jurassic accretionary complex and supposed to be the seamount type limestones. Several P_1 elements of *Norigondolella navicula* were detected from both limestones and their sedimented ages turned out to be at lower Norian together [1].

Huge difference of $^{87}Sr/^{86}Sr$ ratios

The $^{87}Sr/^{86}Sr$ ratios in the seas appear to be everywhere uniform and those of marine carbonates are assumed to be identical to those of seawater at the time of deposition, provided that have not been altered during diagenesis or regional metamorphism.

The $^{87}Sr/^{86}Sr$ ratios of limestones at Mt. Ishimaki have a range of 0.7061-0.7076, while 0.7078-0.7079 at Mt. Zao [1]. When the $^{87}Sr/^{86}Sr$ ratios at Mt. Ishimaki are plotted into $^{87}Sr/^{86}Sr$ curve (Burke's curve) of marine carbonates in Phanerozoic time [2], it is found that the minimum $^{87}Sr/^{86}Sr$ ratio of 0.7061 is numerously lower than the minimum ratio (0.7066) in Burke's curve; Nevertheless these ratios at Mt. Ishimaki satisfy on the Sr/Mn criteria of pure limestones from seawater [3]. On the other hand, the $^{87}Sr/^{86}Sr$ ratios at Mt. Zao fit to Burke's curve adequately.

The $^{87}Sr/^{86}Sr$ ratios of seamount type limestones in Japan sometimes don't fit to Burke's curve. Burke's curve was drawn mainly using the $^{87}Sr/^{86}Sr$ ratios of continental platform type limestones. Burke's curve has to be reexamined by addition of Japanese limestones' data that is expected to remain in ancient seawater distinctly.

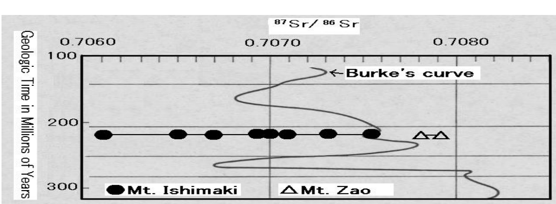

Figure 1: The lowest $^{87}Sr/^{86}Sr$ ratio of limestones in Japan on the $^{87}Sr/^{86}Sr$ ratio curve in Phanerozoic time [2].

[1] Suzuki *et al*. (2008) *Jour. Geol. Soc. Jap.* (in Japanese) Submitted. [2] Burke *et al*. (1982) *Geology* **10**, 516-519. [3] Denison *et al*. (1994) *Chem. Geol.* **112**, 131-143.

The evaluation for the turnover time of the Japan Sea bottom water by ^{129}I

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Because the potencical temperature of the Japan Sea botom water (JSBW) has increased and the dissolved oxygen has decresed during a few decades, the Japan Sea is known as a sensitive ocean for the global warming.

^{129}I is a long –lived radionuclde with a half life of 1.57×10^7 years. Anthropogenic ^{129}I has been released from nuclear weapons testing and the operation of nuclear fuel reprocessing plants. Here, we will present not only the potential of oceanographic tracer of ^{129}I but also the turnover time of JSBW based on ^{129}I.

Seawater samples were collected at Stn. Trap (41°00N, 138°00E) for ^{129}I and ^{14}C by the R/V Soyo-Maru operated by the National Research Institute of Fisheries Science and at Stn. 6 (41°10N, 137°40E) for ^{129}I by the T/V Oshoro-Maru operated by Hokkaido Universuty. Iodine in seawater samples was extracted by the solvent extraction technique. The measurement for ^{129}I and ^{14}C was carried out at the Accelerator Mass Spectrometry facility of Aomori Research and Development Center, Japan Atomic Energy Agency.

The vertical profiles for ^{129}I and ^{14}C showed tha maximum values in the surface and decreasd with depth. The $^{129}I/^{127}I$ ratios in the JSBW which is defined to have the constant potential temperature (below the depth of 2300 m) was $(7.1\pm0.8)\times 10^{-12}$ and $(6.7\pm 0.3)\times 10^{-12}$ for Stn. Trap and Stn. 6, respectively. Taking account of the natural level of $^{129}I/^{127}I = 1.5\times 10^{-12}$, these higher values at the JSBW were the results of the convection of the surface seawater by the sever winter cooling during the nuclear era. On the other hand, ^{14}C at the JSBW also increased from -80 ± 8 ‰ [1] to -58 ± 7 ‰ (this study) during three decades. Therefore the turnover time of JSBW was estimated from the increase of concentration using the same box model for ^{14}C [1]. The turnover times estimated from ^{129}I and ^{14}C were 180 – 210 years and 220 years, respectively. These results consist with the range of 100 – 500 years which were estimated from other tracers. We conclude that ^{129}I is more highly sensitive tracer in the oceanographic studies.

[1] Gamo, T. & Y. Horibe (1983) *J. Oceanogr.* **39**, 220-230