

Supplementary materials for the manuscript “Radiocarbon and Uranium profiles in marine gastropods around Japanese archipelago”

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1. Additional Figures

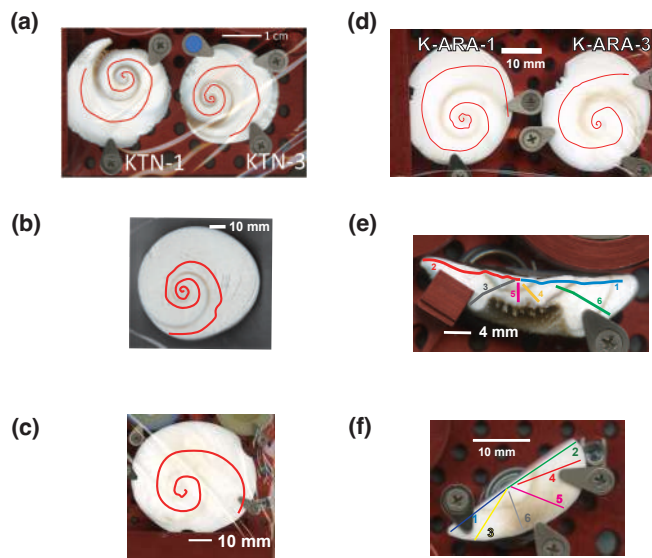


Figure S1: The measurement lines on the calcified opercula of (a) KTN-1 and KTN-3, (b) K-HATE-1, (c) K-NISHI, and (d) K-ARA-1 and K-ARA-3 were shown as red lines. Cross sections of calcified

opercula were also measured shown in (e) KTN-5 and (f) K-ARA-1. Numbers in (e) and (f) correspond to Figure 3(c) for KTN-5 and Figure 3(f) for K-ARA-1, respectively.

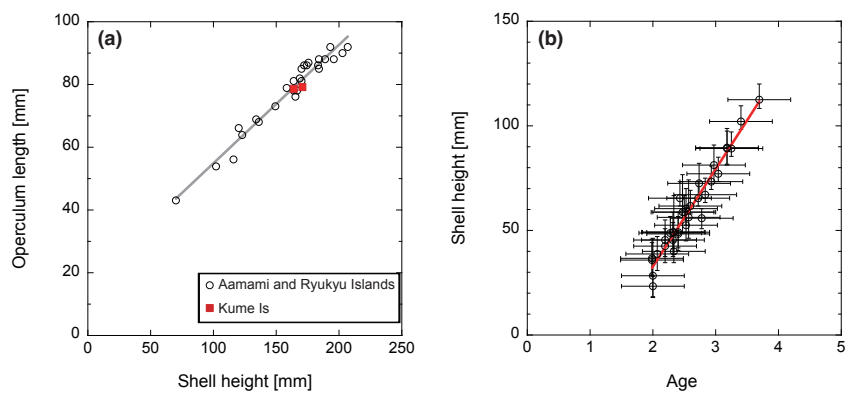


Figure S2: The relationship between (a) maximum operculum length and shell height (Kinoshita, 2007) and between (b) age and shell height (Igari et al., 2001) for *Turbo marmoratus*. Red plots shown in (a) represent living specimens collected at Kume island, K-HATE-1 (using in this study) and K-HATE-2 (not used in this study). The linear regression line (gray line) in (a) denotes operculum length [mm] = $0.3759 \times \text{shell height [mm]} + 17.416$. The linear regression line (red line) in (b) denotes shell height [mm] = $48.826 \times \text{Age [year]} - 61.118$.

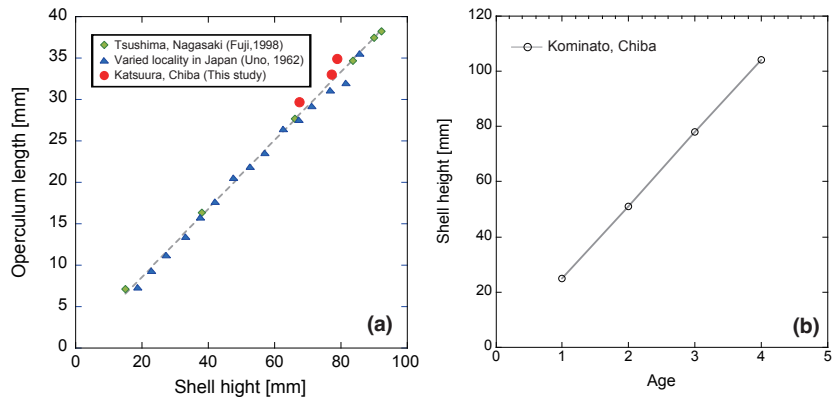


Figure S3: Relationship between (a) maximum operculum length and shell height (Uno, 1962; Fujii, 1998) and between (b) age and shell height (Midorikawa, 1986) for *Turbo sazae*. Red plots shown in (a) represent living specimens collected in Katsuura, KTN-1 and KTN-3 (used in this study), and KTN-4 (not used in this study). The linear regression line (gray dashed line) in (a) denotes operculum length [mm] = $0.4136 \times \text{shell height [mm]} + 0.2611$. The linear regression line (gray line) in (b) denotes shell height [mm] = $26.4 \times \text{Age [year]} - 1.5$.

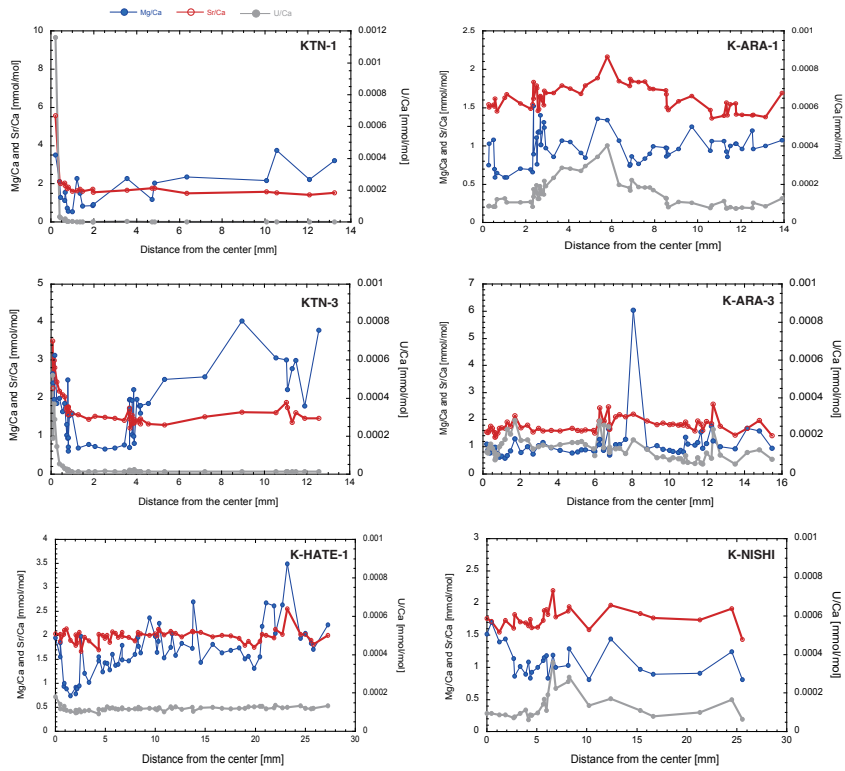


Figure S4: Mg/Ca (blue), Sr/Ca (red) and U/Ca (gray) profiles in *Turbo* sp. specimens measured using laser ablation–inductively coupled plasma–mass spectrometry (LA-ICP-MS)

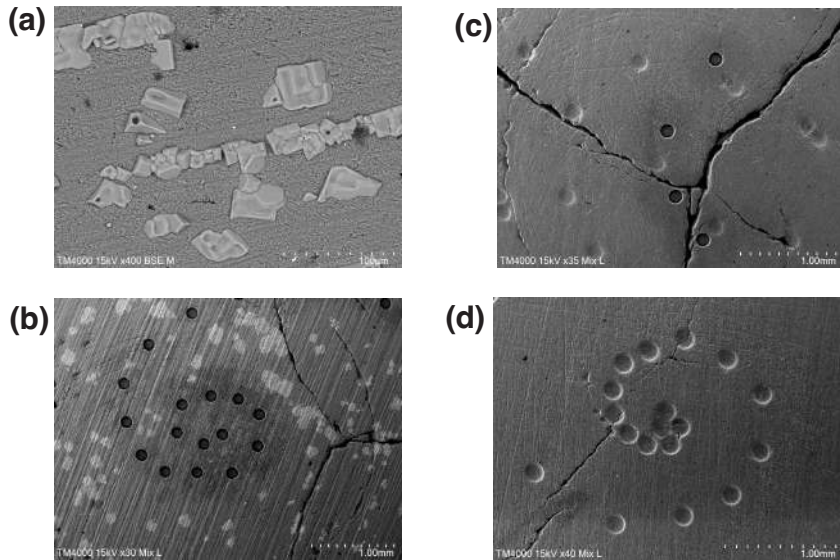


Figure S5: Scanning Electron Microscopy (SEM) images of *Turbo* samples. (a) The area 3–5 mm from the center of K-ARA-1. (b) The area 3–5 mm from the center of K-ARA-3. (c) Central area of K-NISHI. (d) Central area of KTN-3. The holes in these images are spots analyzed by laser ablation–inductively coupled plasma–mass spectrometry (LA-ICP-MS).

削除: Crystal observation of *Turbo* samples using Scanning Electron Microscopy (SEM).

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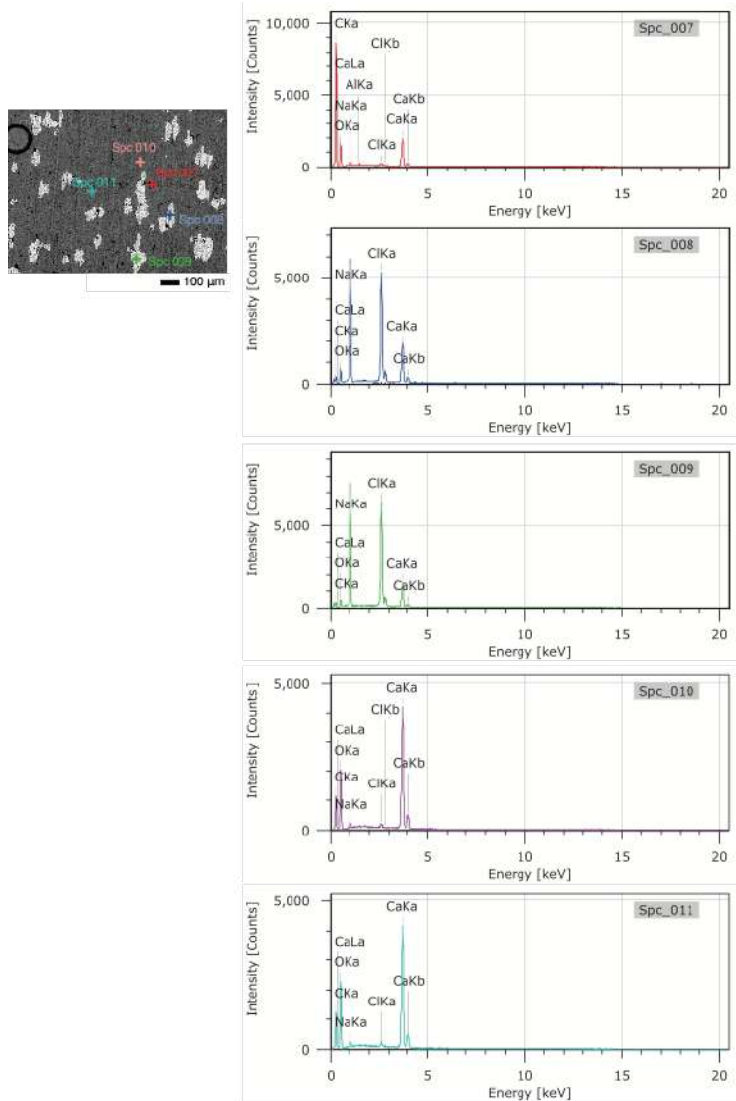


Figure S6: Energy dispersive X-ray spectroscopy (EDS) spectrum of the fossil *Turbo* sample, K-ARA-1 using SEM-EDS. The area 3–5 mm from the center of K-ARA-1 was analyzed. NaCl was detected in Spc 008 and Spc 009.

書式変更: 左揃え

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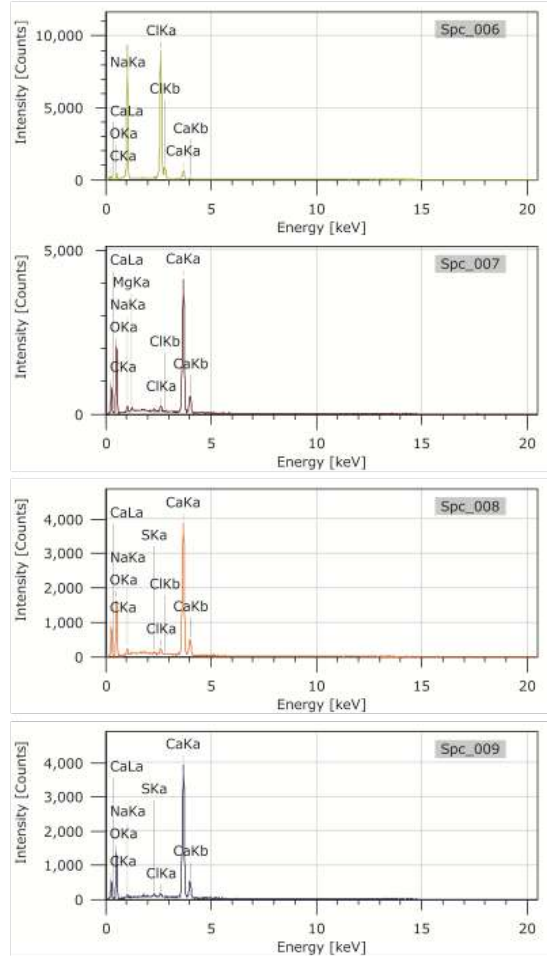
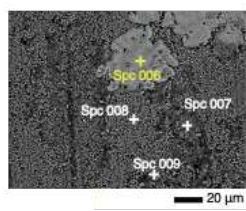


Figure S7: Energy dispersive X-ray spectroscopy (EDS) spectrum of the fossil *Turbo* sample, K-ARA-3 using SEM-EDS. The area 3–5 mm from the center of K-ARA-3 was analyzed. NaCl was detected in Spc 006.

2. Additional Tables

Table S1: Age difference using maximum and minimum uranium concentration in the same specimen for U/Th age calculations.

Sample name	Species	Measured age based on radiocarbon dating		Minimum ²³⁸ U concentration		²³⁰ Th [ppm]	Maximum ²³⁸ U concentration		Expected U/Th age using maximum ²³⁸ U concentration
		cal year BP	U/Th age	²³⁸ U [ppm]	δ ²³⁴ U _m [‰]		²³⁸ U [ppm]	δ ²³⁴ U _m [‰]	
K-ARA-1	<i>Turbo</i> sp.	871	942	0.148	146.41	0.00146	0.857	146.41	142
K-ARA-3	<i>Turbo</i> sp.	647	718	0.096	146.50	0.00072	0.589	146.50	116
K-NISHI	<i>Turbo marmoratus</i>	642	713	0.099	146.51	0.00074	0.651	146.51	108