

SUPPLEMENTARY INFORMATION

Incorporation of Mn, Na and Sr in *A. lessonii* as a function of temperature

E/Ca of specimens of *Amphistegina lessonii* grown under controlled temperature are presented in S. Fig. 1. Both Mn/Ca and Na/Ca values decrease when temperature increases from 21.2 to 26.3 °C, but no significant difference can be found between datasets of 26.3 and 29.5 °C ($p=0.37$ and 0.051 for Mn/Ca and Na/Ca respectively). For Sr/Ca all three temperature groups are significantly different ($p < 0.05$), and the relation of the averages is $Sr/Ca = 0.024 * T + 1.025$ ($R^2 = 0.99$).

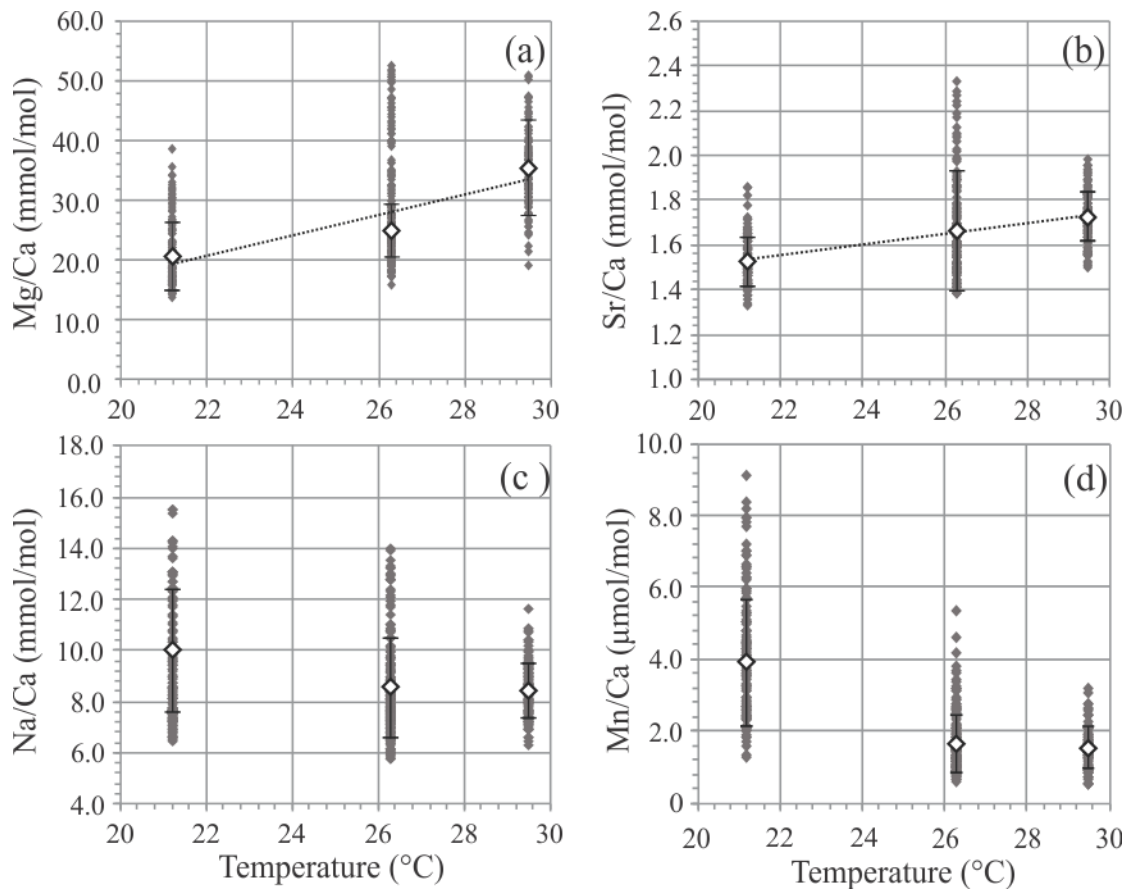


Fig. S1: Incorporation of magnesium (a), strontium (b), sodium (c) and manganese (d) of species *A. lessonii* expressed as E/Ca of individual laser ablation analysis (grey diamonds) and average values (white diamonds) of specimens cultured at 21.2, 26.3 and 29.5 °C. Mg/Ca increases linearly regression over averages by $1.69 * T - 16.50$ with $R^2 = 0.87$. Sr/Ca increases significantly ($p < 0.05$) with temperature by $0.024 * T + 1.025$ ($R^2 = 0.99$) based on the averages.

Species	EPMA maps	Transect maps (total n))	Transect maps (selected for peak-base analysis)
<i>A. tepida</i>	14	23	11
<i>B. marginata</i>	12	15	8
<i>A. lessonii</i>	10	16	10

Table S1: Number of EPMA maps, transect maps and selected transects maps chosen for peak-base analysis.

Temperature (°C)	Mg/Ca (mmol/mol)	Na/Ca (mmol/mol)	Mn/Ca (μmol/mol)	Sr/Ca (mmol/mol)
21.2±0.7	20.5±5.7	10.0±2.4	3.9±1.8	1.5±0.1
26.3±0.3	24.9±4.4	8.6±1.9	1.7±0.8	1.7±0.3
29.5±0.2	35.4±8.1	8.4±1.1	1.6±0.6	1.7±0.1

Table S2: Average element/Ca of *A. lessonii* from the controlled culture experiment by LA-ICP-MS.

Species	²⁴ Mg/Ca mmol/mol (min-max)	³² S/Ca mmol/mol (min-max)
<i>A. lessonii</i> (T. exp.)	27.43 (21.0-36.1)	1.48 (1.21-1.73)
<i>A. lessonii</i> (Aquarium)	36.81	2.15
<i>H. depressa</i> (Aquarium)	153.31	8.41
<i>S. orbiculus</i> (Aquarium)	173.20	10.03
<i>S. angulata</i> (Aquarium)	146.16	8.04
<i>S. communis</i> (Aquarium)	134.21	9.83
<i>Q. pseudoreticulata</i> (Aquarium)	150.27	8.40
<i>Quinqueloculina</i> sp. (Aquarium)	140.50	10.79

Table S3: S/Ca and Mg/Ca values for larger benthic foraminifera from Burgers' Zoo (Aquarium) and *A. lessonii* from the temperature experiment (T. exp;) including min and max values.

Species		Comment	²⁴ Mg/Ca mmol/mol (min-max)	³² S/Ca mmol/mol (min-max)
Hyaline	<i>A. lessonii</i>	Temperature experiment	27.43 (21.0-36.1)	1.48 (1.21-1.73)
	<i>A. lessonii</i>	Burgers' Zoo specimens (T=25°C)	36.81	2.15
	<i>H. depressa</i>	Burgers' Zoo specimens (T=25°C)	153.31	8.41
	<i>A. tepida</i>	EPMA (semi-quantitative)	3.93	1.74
	<i>B. marginata</i>	EPMA (semi-quantitative)	5.52	1.78
	<i>A. lessonii</i>	EPMA (semi-quantitative)	23.87	2.37
	Planktonic species	Field study (Mezger et al., in prep.)	4.14 (3.4-5.4)	1.35 (0.92-1.81)
	NFHS	Carbonate standard (Mezger et al., 2016)	2.95	0.83
	<i>A. lessonii</i>	Salinity experiment (van Dijk et al., 2017)	33.06 (33.0-34.1)	1.32 (0.44-0.47)
	<i>A. gibbosa</i>	pCO ₂ experiment (van Dijk et al., 2017)	33.47 (33.0-34.3)	1.03 (0.95-1.3)
Porcelaneous	<i>S. orbiculus</i>	Burgers' Zoo specimens (T=25°C)	173.20	10.03
	<i>S. angulata</i>	Burgers' Zoo specimens (T=25°C)	146.16	8.04
	<i>S. communis</i>	Burgers' Zoo specimens (T=25°C)	134.21	9.83
	<i>Q. pseudoreticulata</i>	Burgers' Zoo specimens (T=25°C)	150.27	8.40
	<i>Quinqueloculina</i> sp.	Burgers' Zoo specimens (T=25°C)	140.50	10.79
	<i>S. marginalis</i>	pCO ₂ experiment (van Dijk et al., 2017)	157.69 (155.8-159.6)	9.65 (8.95-10.40)

Table S4: Overview of current available S/Ca and Mg/Ca data from several studies, including this study (in bold) and planktonic foraminifera standard NFHS (NIOZ foraminifera house standard). Min and maximum ranges are given when values varied for different culture conditions.

References

Mezger, E. M., de Nooijer, L. J., Boer, W., Brummer, G. J. A., and Reichart, G. J.: Salinity controls on Na incorporation in Red Sea planktonic foraminifera, *Paleoceanography*, <https://doi.org/10.1002/2016PA003052>, 2016.

van Dijk, I., de Nooijer, L. J., Boer, W., and Reichart, G. J.: Sulfur in foraminiferal calcite as a potential proxy for seawater carbonate ion concentration, *Earth and Planetary Science Letters*, 470, 64-72, <http://dx.doi.org/10.1016/j.epsl.2017.04.031>, 2017.