

The Broad Range of Mg within single benthic foraminiferal test: Culture Experimental Evaluation

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Foraminiferal magnesium to calcium ratios (Mg/Ca) depend on both calcification temperature and seawater Mg/Ca composition. Mg/Ca ratio is very constant throughout water column at modern ocean. Therefore, foraminiferal Mg/Ca ratios change as function of temperature. Foraminiferal Mg/Ca ratios have been tried to apply as powerful paleo thermometer. Recently developed equipments that are using electron, ion and laser beams can measure chemical composition at small area. These equipments allow us to measure partial Mg/Ca ratios within foraminiferal single chambers. Foraminifera added new chambers at ultimate end of the test one by one from two chambered juvenile to adult during lifetime. Water temperature during chamber formation should be record on each chamber as the Mg/Ca ratio. This should be good proxy for revealing seasonal water change in past time. It is important and basic knowledge to reconstruct single foraminiferal temperature history that microdistribution of Mg/Ca within foraminiferal test. This study shows that microdistribution of Mg/Ca on chamber wall calcitic crystals were measured for benthic foraminiferal species. Measuring benthic foraminiferal specimens were grown up at three different temperature conditions, 14.7 ± 0.1 centigrade, 17.9 ± 0.2 centigrade and 23.1 ± 0.2 centigrade by electron probe micro analyzer (EPMA). Very large heterogeneities of magnesium concentrations were observed within single chamber walls, even though we cultured specimens under stable temperature conditions. Magnesium concentrations showed no constant values across the ultimate chamber wall. Thus, the Mg/Ca heterogeneity is too large to explain only by the reason of temperature fluctuations during experimental periods. On the other hand, average values of Mg/Ca within single test increased with temperature.