

## High resolution analysis of bivalve shell by NanoSIMS

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We developed a method to measure Mg/Ca, Sr/Ca and Ba/Ca ratios of natural carbonates with high resolution using NanoSIMS. Previous analysis of cultivated giant clam shell with 2 micro-meter spot showed a diurnal variation in the Sr/Ca ratio, which may reflect the daily light cycle. In order to apply the analytical method to other bivalve shell, we measured Mg/Ca, Sr/Ca and Ba/Ca ratios of a Mediterranean mussel collected at the Otsuchi bay, on the Pacific coast of northeastern Japan. This bivalve was living at intertidal zone and collected on September 6<sup>th</sup> 2011. The shell was cut along the maximum growth axis and mounted in Araldite disk together with a carbonate standard. This species is known to form a growth line with organic matter daily or bidaily at the air exposure time, which may facilitate age-model with tidal record by counting the etched-stained lines. After polishing and gold coated, we analyzed trace elements of the shell by low resolution (10 micro-meter spot at 100 micro-meter interval) and high resolution (2 micro-meter spot at 3 micro-meter interval) using NanoSIMS installed at University of Tokyo. Annual variations of Mg/Ca ratios, high in winter and low in summer, are clearly visible at low resolution, similar to those of cultivated giant clam shell. Mg/Ca ratios of the inner edge, corresponding to most recent date together with data of December 2010 estimated by the age-model, show daily or bidaily cyclic changes at high resolution. High Mg/Ca ratios are probably derived from the time of air exposure at low tide when the shell is closed.