

Paleo-SST reconstruction for Kuroshio-Front region based on the Planktonic foraminiferal Mg/Ca ratios

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Introduction:

Recently, Mg/Ca ratios in planktonic foraminiferal calcite is used to determine the past sea surface temperature (SST) in many works. Almost of these works focused on tropic region, not in sub-tropic region. It is difficult to analyze sub-tropic foraminiferal Mg/Ca ratios, because the Mg/Ca ratios of sub-tropic foraminifera is lower than that of tropic. The high-resolution sample, which have high-sedimentation rate, contain low abundance of foraminifera, which make it difficult to estimate paleo-SST from planktonic foraminiferal Mg/Ca ratios. Off Kashima, where the cold Oyashio Current and the warm Kuroshio Current meet each other today, is considered that SST has been significantly varied, because latitudinal position of the Kuroshio Front moved in response to the past climatic change. It is useful to estimate paleo-SST for reconstruction of paleoenvironmental changes at this region. Furthermore, analyses of oxygen isotopes of same species allow us the reconstruction of the paleo-sea surface salinity (SSS), which should give us better constrains on the movement of Kuroshio Front. The objective of this study is to evaluate the usefulness of Mg/Ca ratios paleothermometry off the east coasts of Japan.

Samples and Preparation:

We used sediment sample MD01-2421 piston core taken from off Kashima (36°01.4'N, 141°46.8'E, Depth:2224 m, Length:45 m 82 cm). Because multi-proxy analyses, such as planktonic foraminiferal transfer function and alkenone, have been done in this piston core, this piston core can be used to check reliability of foraminiferal Mg/Ca ratio. As a first step, we used the sampling residue for Mg/Ca analysis, which was collected from ~1.5 m interval of sections of sediment core. Approximately 200 specimens were collected for *Globorotalia inflata* and *Neogloboquadrina dutertrei*, and monospecific batches consists of 30-50 specimens were used to check the reproducibility of analysis. Each samples crushed using two glass plates to open all chamber. After that, clean samples using Milli-Q water, Methanol and Oxidizing reagent. The clean foraminiferal fragments were dissolved by 0.1N HNO₃. Magnesium and calcium analyses were carried out by inductively coupled plasma atomic emission spectrometry.

Results and Discussion:

Duplicate analyses show precision ~0.17 mmol/mol, between 1 and 2 mmol/mol. We need 70-100 cc sediment to keep this precision. Mg/Ca ratios of *G. inflata* and *N. dutertrei* show good agreements. Mg/Ca ratios for both species also show a strong positive correlations with alkenone based SST. These indicate that planktonic foraminiferal Mg/Ca ratios from MD01-2421 core could record paleo-SST off Kashima. It is necessary to construct SST-Mg/Ca calibration using surface sediment in this area. Based on this calibration, we will be able to reconstruct paleo-SST and SSS aided by oxygen isotope for the same sample.