

## Dissolution process of *G. bulloides* shell observed by X-ray CT based on dissolution experiment

IWASAKI, Shinya<sup>1\*</sup> ; KIMOTO, Katsunori<sup>2</sup> ; SASAKI, Osamu<sup>3</sup> ; KANO, Harumasa<sup>3</sup> ; HONDA, Makio<sup>2</sup> ; OKAZAKI, Yusuke<sup>1</sup>

<sup>1</sup>Graduate School of Sciences, Kyushu University, <sup>2</sup>Japan Agency for Marine-Earth Science and Technology, <sup>3</sup>Tohoku University Museum

We performed nine-day dissolution experiments with shells of the planktic foraminifera *Globigerina bulloides* at a pH of  $6.7 \pm 0.1$  in water undersaturated with respect to calcite. *Globigerina bulloides* shells were collected from sediment trap samples in the western subarctic Pacific. The process of dissolution of the shells was quantitatively evaluated with observations made with X-ray micro-computed tomography (CT). On the basis of these observations, we divided the shell structures of *G. bulloides* shells into three categories: early-developed calcite formed during the juvenile stage, inner calcite, and outer calcite. The early-developed and inner calcites had low CT numbers (low density) and were sensitive to dissolution. In contrast, the outer calcite had high CT numbers (high density) and resisted dissolution. Both the mode and frequencies of the CT numbers of *G. bulloides* shells decreased as dissolution progressed. Temporal changes of the histogram of CT numbers as the shells dissolved were quantified in terms of the percentage of calcite volume accounted for by low-density calcite (%low-CT-number calcite volume). There was a linear relationship ( $R^2 = 0.62$ ) between the volume ratio of low-density calcite and shell weight loss. This relationship indicates that shell weight loss can be estimated from the CT number distribution, regardless of the initial condition of the shell, such as size or thickness. We suggest that the X-ray micro-CT method may be used to estimate the extent of foraminiferal shell dissolution with respect to effects on internal structure and shell density.

Keywords: carbonate, planktic foraminifera, X-ray CT, shell weight, shell density, dissolution index