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炭酸塩溶解指標としての浮遊性有孔虫骨格の X 線 CT トモグラフィ
The X-ray tomography of the planktic foraminifera: An useful tracer for evaluating carbonate dissolution

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Oceanic acidification is one of the most concerning issues related with global warming by increasing atmospheric CO2. However, the biological influences for oceanic acidification to oceanic plankton which has carbonate skeletons in the natural conditions are still unclear. Here we propose a new technique assessing shell density of planktic foraminifers quantitatively by the Microfocus X-ray CT scanner (MXCT). We focused on two different types of modern planktic species Globigerina bulloides and Globorotalia inflata to estimate the responses to carbonate dissolution. Former has spheric shells with porous strucures and latter has robust secondary calcite layers, respectively. Both species were taken from surface sediments from ca. 1,000 m water depth in the Southern Ocean that affected less carbonate dissolution.

The mean CT values of individual shells of G. bulloides and G. inflata showed large variations within each specimens and indicated degradation of shell density. It attributed the variations of shell density to differential dissolution on the seafloor, but it was identified as the cause of shell ontogeny in each specimens. Furthermore, we performed dissolution experiments in acidification chamber by using CO2 diffuser at the laboratory to examine progressive dissolution for each species. The decreasing of mean CT values of both species consistent with progress of carbonate dissolution observed by scanning electron microscope (SEM). Early formed shells (inside shells) were thinner compared with outer ones, therefore that were lost earlier than outer shells. On the other hand, outer shells of the final whorl were thicker and resistant to dissolution. However, it was observed remarkable partial dissolution at the inside of walls in the outer shells. In other words, we could recognized the dissolution “ patterns ” for each species through these experiment and it indicated that shell density of planktic foraminifers is an useful indicator of carbonate dissolution.

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