

High-resolution stable isotopic analysis of CaCO₃ to clarify the life history recorded in fish otolith

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Japanese sardine is one of the important fish resources in Japan because they are utilized in our food, and used as fish meal. To keep these natural fish resources, we need to understand the life cycle of fishes. In recent years, previous studies reported that the stable isotopic records in otolith of fish reflect the ecology of their live. In this study, we analyze the stable isotopic composition of otolith of Japanese sardine in high resolution (=microscale: <100micrometer) to detect the environmental changes recorded in each growth stage of otolith. To realize the high-resolution microscale-analysis, we employed Geomill326 to mill otolith in microscale, and the microscale isotopic analytical system (MICAL3c) to determine isotopic compositions of small amounts of milled samples. As a result, we found that the stable isotopic composition in the center of otolith has different isotopic value with the outer edge of otolith. Especially, the seawater temperature calculated from stable oxygen isotope ratio in the outer edge of otolith is comparable with the water temperature at the time they captured. In addition, we successfully detect the life history of fish for each growth stages in high resolution. This demonstrated work is the first collaboration between Geomill326 and MICAL3c.

Keywords: otolith, stable isotope, microscale analysis, high resolution, environmental proxy, carbonate