

Reliable stable isotopic compositions of individual *Uvigerina* spp. as sea environmental proxy

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The stable carbon and oxygen isotopic composition ($\delta^{13}\text{C}$, $\delta^{18}\text{O}$) of benthic foraminiferal carbonate shells have been used to reconstruct the past sea environment. Especially, *Uvigerina* spp. is often used to estimate the sea level changes and deep-sea circulations. However, it is difficult to analyze the isotopic compositions of individual foraminifera in the traditional analytical method, and thus the reliability of $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ of individual *Uvigerina* spp. as sea environmental proxy is still unclear. In this study, the isotopic compositions of individual *U. akitaensis* and *U. ochotica* were analyzed by using the micro-scale isotopic analytical system.

Surface sediment samples were collected from the four sites in the Sea of Okhotsk during cruise MR06-04 of R/V Mirai (JAMSTEC) in October 2006. Those samples were cut for each 1 cm (0-8cm below the seafloor) and used in this study. Then the living (Rose Bengal stained) individuals of *U. akitaensis* and *U. ochotica* from samples were analyzed by the micro-scale isotopic analytical system (Ishimura et al. 2008).

As a result, the isotopic dispersions of *Uvigerina* spp. indicated about ± 0.2 ‰ for both $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ in all sampling sites. In addition, isotopic values of *Uvigerina* spp. showed almost constant values in same species regardless of sediment depth, individual weight, and variation of shell structure. The observed homogeneous isotopic compositions of *Uvigerina* spp. were comparable with isotopic homogeneity and dispersions of NBS-19 (international isotopic standard). Therefore, we concluded that the individual *Uvigerina* spp. have highly reliable isotopic composition as sea environmental proxy. However, $\delta^{13}\text{C}$ values represented about 0.7 ‰ differences between *U. akitaensis* and *U. ochotica*, thus we have to consider this $\delta^{13}\text{C}$ difference in *Uvigerina* spp. when we reconstruct the past sea environment based on $\delta^{13}\text{C}$ of *Uvigerina* spp.

Our main conclusion in this study is that the individual *Uvigerina* spp. have highly reliable stable isotopic compositions as sea environmental proxy.

Keywords: stable isotope, benthic foraminifera, microscale analysis, *Uvigerina*