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Algal carbon processing by benthic foraminifera and microbes across the Arabian Sea Oxygen Minimum Zone

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Benthic foraminifera are major component among deep-sea benthic ecosystems and are also known as major consumers of phytodetritus. They become further major components under hypoxic/dysoxic environments where metazoan abundances decreased or disappeared. In an oxygen minimum zone where characterized by high organic matter inputs and subsequent dysoxic conditions, benthic foraminifera should play major roles in the carbon cycling at the sediment-water interface. Here, we carried out in situ experiments using manned submersible SHINKAI 6500 to clarify the foraminiferal feeding (carbon uptake)- and respiration activities (mineralization) associate with oxygen gradients both across-sites and across-sediment-water interface.
In situ incubation experiments were carried out at 3 stations using in situ incubation cores. The cores were designed to maintain oxygen concentrations in the core as same as those of ambient water. After deployments of in situ culture cores, 13C-labeled algae were introduced and incubations were terminated after 3 and 5 days. In each incubation term, we had 2 or 3 replicate cores to see spatial variability of the processing of the label. After recovery on board, the cores were sectioned into 11 layers down to 15 cm depth in the sediment. Interstitial water was extracted from every sediment layers using a centrifuge machine. Nitrate+nitrite and ammonium concentrations for both background and experimental cores were determined on board using a spectrometer. The rest of the sediments were used for the analysis of microbial and foraminiferal uptakes. Preliminary results suggest different patterns of mineralization between sites; center of OMZ site showed increases of ammonium while lower boundary of OMZ site showed increase of nitrate+nitrate. Microbial analysis suggest different microbes contribute these algal processing in addition to foraminifera.