

Oxygen dynamics at sediment-water interface in continental slope, Northeast Japan

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Introduction

Oxygen is a key element to understand distributions of benthic organisms, microbial respiration and aerobic degradation of organic matter at and below the sediment-water interface (SWI). Northeast Japan is considered a high primary productivity area ($400\text{--}1000\text{ mgC m}^{-2}\text{ d}^{-1}$) [1], what induces a significant O_2 depletion ($25\text{--}40\text{ }\mu\text{M}$) between 900 and 1100 m deep in the water column [2]. Nevertheless, few studies have been proceeded on biogeochemical cycles at sediment surface in this area.

Methods and results

On 2007, we obtained two dimensional O_2 profile at 975 m (41.00°N , 142.03°E) with an *in situ* planar O_2 optode. The instrument was designed in a previous study [3], and was deployed on the sea floor with a lander. The O_2 penetration depth by diffusion below the SWI was estimated to 3.5 mm. Furthermore, the O_2 distribution showed an obvious vertical heterogeneity, with enhanced penetration related to ophiuroid presence. In 2011, sediment cores were recovered at 1033 m (41.15°N , 142.00°E) close to the lander deployment site. O_2 profiles and diffusive uptakes ranged between 3.9–5.8 mm.

Discussion

Our results showed that O_2 penetration depth was close to the values obtained from 1450 m in Sagami Bay (East Japan) of $3.9\pm 1.5\text{ mm}$ [3], where the primary productivity is comparable ($400\text{ mgC m}^{-2}\text{ d}^{-1}$) [4] with our study area. Significant differences in terms of O_2 concentration in water ($\sim 50\text{ }\mu\text{M}$) [4], benthic habitats and communities were identified by ROV observation. They may explain different O_2 supply into the sediments.

[1] Ishizaka (1998) *J. Oceanogr.*, **54**, 553–564. [2] Fontanier *et al.* (2014) *J. Foram. Res.*, **44**, 281–299. [3] Glud *et al.* (2005) *Deep-sea Res.*, **52**, 1974–1987. [4] Kitazato *et al.* (2003) *Prog. Oceanogr.*, **57**, 3-16.